

A403309
DOCKET NO. 2010-029 CAUSE NO. UIC-358.1

BEFORE THE BOARD OF OIL, GAS AND MINING

DEPARTMENT OF NATURAL RESOURCES

IN AND FOR THE STATE OF UTAH

IN THE MATTER OF THE APPLICATION OF
WESTWATER FARMS, LLC, FOR ADMINISTRATIVE
APPROVAL OF THE HARLEY DOME 1 SWD WELL
LOCATED IN SECTION 10, TOWNSHIP 19 SOUTH,
RANGE 25 EAST, SLM, GRAND COUNTY, UTAH,
AS A CLASS II INJECTION WELL.

DOCKET NO. 2010-029 CAUSE NO. UIC-358.1

TAKEN AT: Department of Natural Resources
1594 West North Temple, Room 1040
Salt Lake City, Utah

DATE: Wednesday, December 8, 2010

TIME: 10:42 a.m. to 4:38 p.m.

REPORTED BY: Michelle Mallonee, RPR

ATKINSON BAKER COURT REPORTING
JOB #A403309

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<p>1 APPEARANCES</p> <p>2</p> <p>3 BOARD OF OIL, GAS AND MINING:</p> <p>4 Douglas E. Johnson, Chairman</p> <p>5 Ruland J. Gill, Jr.</p> <p>6 Jake Y. Harouny</p> <p>7 James T. Jensen</p> <p>8 Kelly L. Payne</p> <p>9 Samuel C. Quigley</p> <p>10 Jean Semborski (Excused)</p> <p>11</p> <p>12 DIVISION OF OIL, GAS AND MINING:</p> <p>13 John R. Baza, Director</p> <p>14 Dana Dean, Associate Director, Mining</p> <p>15 John Rogers, Associate Director, Oil and Gas</p> <p>16 Jim Springer, Public Information Officer</p> <p>17 Steve Schneider, Administrative Policy Coordinator</p> <p>18 Julie Ann Carter, Secretary to the Board</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> <p style="text-align: right;">Page 2</p>	<p>1 I N D E X</p> <p>2 WITNESS PAGE</p> <p>3 David Stewart</p> <p>4 Direct Examination by Mr. Clawson 18</p> <p>5 Cross-Examination by Mr. Hill 59</p> <p>6 Cross-Examination by Mr. Shea 63</p> <p>7 Cross-Examination by Mr. Harouny 92</p> <p>8 Redirect Examination by Mr. Clawson 93</p> <p>9</p> <p>10 David Allin</p> <p>11 Direct Examination by Mr. Clawson 94</p> <p>12 Cross-Examination by Mr. Shea 160</p> <p>13</p> <p>14 Christopher Kierst</p> <p>15</p> <p>16 Direct Examination by Ms. Lewis 177</p> <p>17 Cross-Examination by Mr. Jensen 181</p> <p>18 Cross-Examination by Mr. Payne 184</p> <p>19 Cross-Examination by Mr. Shea 186</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> <p style="text-align: right;">Page 4</p>
<p>1 FOR WESTWATER FARMS, LLC:</p> <p>2 THOMAS W. CLAWSON, ESQ.</p> <p>3 VAN COTT, BAGLEY, CORNWALL & MCCARTHY</p> <p>4 36 South State Street</p> <p>5 Suite 1900</p> <p>6 Salt Lake City, Utah 84111</p> <p>7</p> <p>8 FOR THE DIVISION OF OIL, GAS, AND MINING:</p> <p>9 EMILY LEWIS, ESQ.</p> <p>10 UTAH ATTORNEY GENERAL'S OFFICE</p> <p>11 Natural Resources Division</p> <p>12 1594 West North Temple</p> <p>13 Suite 300</p> <p>14 Salt Lake City, Utah 84116</p> <p>15</p> <p>16 FOR LIVING RIVERS:</p> <p>17 PATRICK A. SHEA, ESQ.</p> <p>18 PATRICK A. SHEA, PC</p> <p>19 252 South 1300 East</p> <p>20 Suite A</p> <p>21 Salt Lake City, Utah 84102</p> <p>22 JACQUE RAMOS, ESQ.</p> <p>23 J. RAMOS LAW FIRM</p> <p>24 2709 Chadwick St.</p> <p>25 Salt Lake City, UT 84016</p> <p style="text-align: right;">Page 3</p>	<p>1 Docket No. 2010-029 Cause No. UIC-358.1</p> <p>2 Wednesday, December 8, 2010</p> <p>3 (The proceedings began at 10:42 a.m.)</p> <p>4 CHAIRMAN JOHNSON: Let's go back on the record.</p> <p>5 Let me find my agenda again now. Okay.</p> <p>6 This is Docket No. 2010-029 Cause No. UIC-358.1.</p> <p>7 In the Matter of the Application of Westwater Farms, LLC,</p> <p>8 for Administrative Approval of the Harley Dome 1 SWD Well</p> <p>9 Located in Section 10, Township 19 South, Range 25 East,</p> <p>10 SLM, Grand County, Utah, as a Class II Injection Well.</p> <p>11 Mr. Clawson, you are representing Westwater</p> <p>12 Farms?</p> <p>13 MR. CLAWSON: That's correct. Tom Clawson on</p> <p>14 behalf of Westwater Farms, LLC.</p> <p>15 CHAIRMAN JOHNSON: Mr. Alder.</p> <p>16 MR. ALDER: Mr. Chairman and Members of the</p> <p>17 Board, if I might take a moment. I'd like to introduce</p> <p>18 Emily Lewis to the Board. She is a professional graduate</p> <p>19 from the University of Utah Law School and a member of</p> <p>20 the fellowship program with the Patrick O'Hara Fellowship</p> <p>21 Program that we do. She has been working with the</p> <p>22 Attorney General's office for some time, recently -- is</p> <p>23 now a member of the Bar. And she will be representing</p> <p>24 the Division in this matter.</p> <p>25 CHAIRMAN JOHNSON: Okay, thank you.</p> <p style="text-align: right;">Page 5</p>

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<p>1 Good morning, Ms. Lewis.</p> <p>2 MS. LEWIS: Good morning.</p> <p>3 CHAIRMAN JOHNSON: And there is a respondent in</p> <p>4 this matter, Living Rivers.</p> <p>5 MR. SHEA: Yes. My name is Patrick Shea. And</p> <p>6 Jacque Ramos is an attorney who is associated with me.</p> <p>7 Then we have Mr. John Weisheit, who is the principal</p> <p>8 behind Living Rivers.</p> <p>9 CHAIRMAN JOHNSON: Okay. Thank you, Mr. Shea.</p> <p>10 MR. SHEA: And I do apologize for the delay. I</p> <p>11 learned that Delta Airlines in Phoenix has a 30-minute</p> <p>12 rule. If you are not there 30 minutes ahead of time,</p> <p>13 they won't let you check in. So I literally watched my</p> <p>14 airplane take off at 6 a.m.</p> <p>15 CHAIRMAN JOHNSON: Okay. We're glad you made</p> <p>16 it, Mr. Shea.</p> <p>17 Mr. Clawson, would you please go ahead.</p> <p>18 MR. CLAWSON: I'd be glad to. I wonder,</p> <p>19 however, though -- Mr. Shea filed a motion last night,</p> <p>20 and I wonder if we want to deal with that before we head</p> <p>21 into our case-in-chief.</p> <p>22 CHAIRMAN JOHNSON: Okay. Do we have a copy of</p> <p>23 that motion?</p> <p>24 MR. SHEA: We have copies here. I had asked</p> <p>25 Mr. Alder to get you copies. If you don't, we can</p> <p style="text-align: right;">Page 6</p>	<p>1 obviously, parties to the south of us that have keen</p> <p>2 interest in the quality of that water.</p> <p>3 So one of the reasons that Mr. Weisheit</p> <p>4 contacted me was that he and Mr. Bowers, in starting</p> <p>5 Living Rivers, were particularly concerned that the</p> <p>6 Colorado River be maintained in its purity, if you will,</p> <p>7 or in its flow without unanticipated pollution. And we</p> <p>8 simply would be suggesting in our motion for the</p> <p>9 continuance, and in the alternative for certain</p> <p>10 preconditions, that certain measures be taken. I think</p> <p>11 everybody is aware of, certainly, the BP spill, that</p> <p>12 unanticipated things do happen. And we look back on</p> <p>13 those and wonder why some precaution wasn't taken.</p> <p>14 So I do appreciate the applicant's desire for</p> <p>15 moving this ahead as quickly as possible. But I think</p> <p>16 taking until your January meeting is not out of line so</p> <p>17 that we could supply some additional hydrological and</p> <p>18 hydrogeological information that would confirm or not</p> <p>19 confirm the proposed project.</p> <p>20 CHAIRMAN JOHNSON: So, Mr. Shea, in a nutshell</p> <p>21 you are asking for a continuance of this matter?</p> <p>22 MR. SHEA: In the first instance. Or in the</p> <p>23 alternative --</p> <p>24 CHAIRMAN JOHNSON: Or in the alternative, the</p> <p>25 requested conditions to attach?</p> <p style="text-align: right;">Page 8</p>
<p>1 distribute them now.</p> <p>2 CHAIRMAN JOHNSON: I don't recall seeing --</p> <p>3 MR. QUIGLEY: It's in our packet.</p> <p>4 CHAIRMAN JOHNSON: It's in the red folder?</p> <p>5 MR. SHEA: If it's all right, Mr. Chair, we'd</p> <p>6 give you those now.</p> <p>7 While they're being distributed, if I might</p> <p>8 explain what we're seeking today. Our first effort is</p> <p>9 for a continuance for additional data to be received by</p> <p>10 the Board. We understand from communication with USGS</p> <p>11 and the United States Fish and Wildlife Service that</p> <p>12 they'll be making further additional letters. We don't</p> <p>13 have that in written confirmation, only by telephone.</p> <p>14 Second, we will be requesting the Board to</p> <p>15 consider certain preconditions. If, in fact, you decide</p> <p>16 to go ahead and approve the application, the most</p> <p>17 important of that precondition would be the drilling of</p> <p>18 three monitor wells to make sure that we would have early</p> <p>19 warning on any potential seepage that was unexpected</p> <p>20 going towards the Colorado River.</p> <p>21 I note with interest that our Governor Herbert</p> <p>22 is in Las Vegas today. And one of the heated topics</p> <p>23 yesterday was the status of the Colorado River. It is</p> <p>24 one of the three main rivers in North America:</p> <p>25 Mississippi, Colorado, and the Snake. And there are,</p> <p style="text-align: right;">Page 7</p>	<p>1 MR. SHEA: Right.</p> <p>2 CHAIRMAN JOHNSON: And that's a motion that you</p> <p>3 filed last night?</p> <p>4 MR. SHEA: Right. Unfortunately, it didn't get</p> <p>5 sent until 5:07 because I was out. But -- and let me add</p> <p>6 one of the other requests -- which I think you could rule</p> <p>7 on now -- is a request to keep the record open. So that</p> <p>8 even if you do make a decision, we could supply some</p> <p>9 additional information that we think will be forthcoming.</p> <p>10 But I certainly couldn't stand here today and promise it</p> <p>11 to you. I've literally been on this matter for less than</p> <p>12 a week.</p> <p>13 CHAIRMAN JOHNSON: Mr. Clawson, have you had a</p> <p>14 chance to review the request for continuance?</p> <p>15 MR. CLAWSON: Well, I received it sort of by</p> <p>16 happenstance at 8 o'clock last night. So I have reviewed</p> <p>17 it. And the way I would respond to the motion is, is</p> <p>18 that obviously we haven't had an opportunity to prepare a</p> <p>19 written response. It makes a number of factual</p> <p>20 allegations without any foundation. There's no</p> <p>21 affidavit, there is no sworn testimony. It suffers in</p> <p>22 that there's no motion. In regards to factual</p> <p>23 statements, there's no motion.</p> <p>24 I mean, I view this as two things. One, it's an</p> <p>25 untimely submittal of objections to the permit. This</p> <p style="text-align: right;">Page 9</p>

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<p>1 should have been filed two weeks ago. This is the first 2 we've actually seen a written statement of what they are 3 concerned about. I think if they do that, there needs to 4 be a motion to show good cause why they should be able to 5 bring these points up at the hearing.</p> <p>6 And then secondly, as to the motion to -- I 7 mean, we obviously object to the motion to continue. 8 We've already been through this.</p> <p>9 And as to the motion to keep the record open so 10 that they can submit -- maybe submit some more 11 information that might be prepared by some other people, 12 I don't think that's well put. And I think that at the 13 end of today's hearing, the Board can decide whether or 14 not it needs any more information or not. We would 15 object to the submittal of any factual information as 16 being untimely at this point.</p> <p>17 That being said, we have had an opportunity to 18 look through this motion and the factual allegations. 19 We're ready to meet them heads on. We don't think they 20 make any sense whatsoever. It shows almost a total 21 misunderstanding of what this project is about.</p> <p>22 I would submit that we should go ahead with this 23 hearing. We'll go ahead with our case-in-chief as 24 prepared. And then at the end of each of my witnesses' 25 testimony, we can go through the portion of this letter</p> <p style="text-align: right;">Page 10</p>	<p>1 information as possible in making our decision, how would 2 you be disadvantaged by putting this off for a month, 3 assuming that you are here, ready, you've got people that 4 have probably traveled a great distance. Would you just 5 go into that a little the bit?</p> <p>6 MR. CLAWSON: I'd be glad to. It was actually 7 included in our rebuttal -- or our response to the 8 previous motion to continue.</p> <p>9 It's not just one month, it's two months. You 10 know, we're talking the end of January. It's about -- 11 what was it, seven weeks? It's just short of two months 12 because of the Board's -- you know, the way it schedules 13 the November and the December hearings. There is, 14 concurrent with this proceeding, another conditional use 15 permit proceeding tonight for Grand County to be held 16 down in Moab. And one of the conditions of the grant of 17 that Conditional Use Permit is approval by the Board or 18 the Division of this UIC operation. And so by putting 19 this hearing off, we also put off the conditional use 20 permit hearing.</p> <p>21 It's not the Board's responsibility to keep a 22 planning hearing going in Grand County. But it has the 23 consequence of delaying that decision, probably, into 24 February. That decision, being the Grand County 25 Planning -- it's the Planning Commission hearing tonight.</p> <p style="text-align: right;">Page 12</p>
<p>1 that pertains to their particular expertise or personal 2 knowledge, and with sworn testimony address those issues. 3 And then the Board can decide whether or not there's 4 still remaining issues.</p> <p>5 CHAIRMAN JOHNSON: Ms. Lewis, do you have any 6 comments?</p> <p>7 MS. LEWIS: The Division feels that -- agrees 8 that the motion has been untimely. But if the Board 9 feels that after hearing the testimony today you need 10 more time to make your decision, we would agree with 11 that, as well.</p> <p>12 MR. SHEA: Could I ask one question?</p> <p>13 CHAIRMAN JOHNSON: Mr. Shea.</p> <p>14 MR. SHEA: Would it be possible, just for 15 efficiency's sake, I agree -- Mr. Clawson is an excellent 16 lawyer and is obviously quite well prepared today. I 17 would like an opportunity after his witnesses have given 18 their direct testimony to cross-examine them as to the 19 factual representations they are making. I think that 20 would be an efficient way to handle it.</p> <p>21 CHAIRMAN JOHNSON: As a respondent, that is what 22 you will be afforded.</p> <p>23 MR. SHEA: All right. Thank you.</p> <p>24 CHAIRMAN JOHNSON: Mr. Gill.</p> <p>25 MR. GILL: Just so that we have as complete</p> <p style="text-align: right;">Page 11</p>	<p>1 That will put it off into February. So really, there's 2 at least a two-month delay.</p> <p>3 This well is ready to go. They have contracts 4 with people that are -- operations that are seeking to 5 inject this water into this facility. They have 6 general -- or service contracts with oil and gas 7 operators. And you know, if approval were given, they 8 could start injecting in just a matter of weeks, which is 9 a revenue flow. So it costs them money the longer they 10 wait.</p> <p>11 That, on top of the fact that we're ready to go. 12 We've been ready to go. As part of my introduction, I 13 mean -- you know, one thing to keep in mind is this is a 14 generic UIC application. There's nothing special about 15 this injection well. It's standard form. The Division 16 would have approved it administratively, but for the fact 17 that when they published notice of it there were some 18 objections filed, one of which was withdrawn; the other 19 one being Living Rivers, who is here today to make their 20 case; and a third by a person, an individual, William 21 Love, who, you know, did not respond to the Request for 22 Agency Action.</p> <p>23 That was back in September. So they've already 24 knocked this off track for September, October, November, 25 and we're in December. And now they want more time to</p> <p style="text-align: right;">Page 13</p>

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<p>1 prepare their case. And I just think that's bad form.</p> <p>2 CHAIRMAN JOHNSON: Okay.</p> <p>3 Does the Board have any other questions or</p> <p>4 comments on this?</p> <p>5 Mr. Jensen.</p> <p>6 MR. JENSEN: It seems to me that we have</p> <p>7 addressed this issue of a continuance and understand the</p> <p>8 concerns. I personally think that we ought to go</p> <p>9 forward, understanding that there is no guarantee that by</p> <p>10 going forward that this Board is going to reach a</p> <p>11 decision today.</p> <p>12 MR. CLAWSON: Absolutely.</p> <p>13 MR. JENSEN: So you may very well have this</p> <p>14 issue. But it seems to me that we ought to go forward</p> <p>15 and let the parties put on their evidence and see if they</p> <p>16 can sustain their burden of proof. And let's see where</p> <p>17 it goes.</p> <p>18 MR. GILL: Do you need to hear from Mr. Shea?</p> <p>19 CHAIRMAN JOHNSON: Mr. Shea.</p> <p>20 MR. SHEA: Could I make one point? I did talk</p> <p>21 to Pam Hackley, who is the staff person for the Grand</p> <p>22 County Planning Commission, about the hearing tonight.</p> <p>23 And she says that there's still a lot of questions. It's</p> <p>24 not definitive that it's going to go forward. So I don't</p> <p>25 think that that should be a driving force for the Board</p> <p style="text-align: right;">Page 14</p>	<p>1 but somebody who is quite familiar with Division of Oil,</p> <p>2 Gas and Mining, that having had an informal proceeding</p> <p>3 would have facilitated the flow of information. And it</p> <p>4 was at the petitioner's request that it became formal.</p> <p>5 That's a distinction that many of the people who</p> <p>6 don't regularly appear before the Board understand. But</p> <p>7 if we're looking for information, that is one step that</p> <p>8 ought to be looked at in the future to generate some</p> <p>9 additional information -- not to say that it's not proper</p> <p>10 that we're here today on a formal adjudication.</p> <p>11 CHAIRMAN JOHNSON: Okay.</p> <p>12 Mr. Payne.</p> <p>13 MR. PAYNE: Motion to deny the request for</p> <p>14 continuance.</p> <p>15 CHAIRMAN JOHNSON: Okay.</p> <p>16 Is there a second?</p> <p>17 MR. JENSEN: Second.</p> <p>18 CHAIRMAN JOHNSON: It's been moved and seconded</p> <p>19 to deny the request for continuance.</p> <p>20 Any other discussion?</p> <p>21 All those in favor say "aye."</p> <p>22 THE BOARD: Aye.</p> <p>23 CHAIRMAN JOHNSON: Is anyone opposed?</p> <p>24 So the request for continuance is not granted.</p> <p>25 Mr. Clawson, could you move ahead with your</p> <p style="text-align: right;">Page 16</p>
<p>1 making a decision this morning.</p> <p>2 MR. GILL: I think it would be fair to put on</p> <p>3 notice, though, that at least one Board member under</p> <p>4 40-6-1 believes that this Board has exclusive authority</p> <p>5 over oil and gas operations, including the matter being</p> <p>6 heard today. And the planning commission's involvement</p> <p>7 in that would be outside the statute and completely</p> <p>8 barred. And there would be an appropriate motion be made</p> <p>9 through the Board, I believe, that would bar them from</p> <p>10 any further actions on this matter, that the matter is</p> <p>11 completely within the matter of this Board by law.</p> <p>12 MR. SHEA: I certainly have had my experiences</p> <p>13 in dealing with counties.</p> <p>14 MR. GILL: That doesn't change what the County</p> <p>15 will do.</p> <p>16 MR. SHEA: I don't want to even get in that</p> <p>17 fight.</p> <p>18 CHAIRMAN JOHNSON: The question before us right</p> <p>19 now is a request for continuance.</p> <p>20 And based upon the discussions and arguments</p> <p>21 we've heard, I see no reason that the Board should grant</p> <p>22 a continuance, which is actually the second request for</p> <p>23 continuance in this matter.</p> <p>24 MR. SHEA: Could I just make one procedural</p> <p>25 observation? It does seem to me, again, as an outsider,</p> <p style="text-align: right;">Page 15</p>	<p>1 case.</p> <p>2 MR. CLAWSON: Sure. I'm just going to jump</p> <p>3 right into it. The Board's got other items on its</p> <p>4 agenda. And I think you understand basically what's</p> <p>5 going on here. I'm going to jump into it.</p> <p>6 I have two witnesses here today. On my right is</p> <p>7 Dave Stewart. He is the president of ERPWD, who is --</p> <p>8 and Westwater Farms, the applicant, is an affiliate of</p> <p>9 that organization. Dave is also a professional engineer</p> <p>10 and the chief technical officer of Produced Water</p> <p>11 Development, LLC, which is the owners of the ERPWD.</p> <p>12 And on my left is Dave Allin. He's a consulting</p> <p>13 geologist and hydrological engineer working for Westwater</p> <p>14 Farms for the purposes of this UIC application for the</p> <p>15 Harley Dome No. 1 well. And I ask that my witnesses be</p> <p>16 sworn in at this time.</p> <p>17 CHAIRMAN JOHNSON: Let's do that, please.</p> <p>18 THE REPORTER: Will you raise your right hands,</p> <p>19 please.</p> <p>20 You and each of you do solemnly swear the</p> <p>21 testimony you are about to give will be the truth, the</p> <p>22 whole truth, and nothing but the truth so help you God?</p> <p>23 (The witnesses answered in the affirmative.)</p> <p>24 MR. CLAWSON: My first witness is Dave Stewart.</p> <p>25 DAVID R. STEWART,</p> <p style="text-align: right;">Page 17</p>

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<p>1 having been first duly sworn, 2 was examined and testified as follows: 3 DIRECT EXAMINATION 4 BY MR. CLAWSON: 5 MR. CLAWSON: Would you please state your name 6 and address for the record. 7 MR. STEWART: David R. Stewart. 3801 Automation 8 Way, Suite 200, Fort Collins, Colorado, 80525. 9 MR. CLAWSON: And what is your affiliation with 10 Westwater Farms, LLC? 11 MR. STEWART: I'm a partner of ERPWD, which is 12 an affiliate of Westwater Farms, LLC. 13 MR. CLAWSON: And what are your principal 14 responsibilities in that position? 15 MR. STEWART: I'm the chief technical officer 16 for PWD, and I do all the scientific engineering aspects, 17 administer that. 18 MR. CLAWSON: Would you please give us a brief 19 statement of your education and experience? 20 MR. STEWART: Sure. I'm an engineer for over 35 21 years. I have a BS in civil engineering, a masters in 22 environmental engineering, MBA and a Ph.D. in 23 environmental engineering. 24 MR. CLAWSON: And how long have you been working 25 in the environmental industry?</p> <p style="text-align: right;">Page 18</p>	<p>1 MS. LEWIS: No. 2 CHAIRMAN JOHNSON: Mr. Shea. 3 MR. SHEA: Could I ask a foundational question 4 on the sampling that he's testifying to? 5 I was given this morning some data which 6 reflects modeling as opposed to actual testing of the 7 waste water that would be injected. 8 Could you clarify how the model was generated? 9 MR. STEWART: Sure. We took daily samples for 10 an eight-week period, produced water, that we tested in 11 our pilot plan at the site. We also had formation water 12 that we obtained during the drilling of the injection 13 well. 14 MR. SHEA: And when you say "produced water," is 15 that produced from where? 16 MR. STEWART: From oil and gas wells from the 17 Uinta-Piceance basins. 18 MR. SHEA: Do we have the precise location, or 19 is this -- 20 CHAIRMAN JOHNSON: Mr. Shea, we're trying to 21 decide whether or not Mr. -- or Dr. Stewart should be 22 treated as an expert witness. I think he's going to be 23 getting into testimony. 24 Do you have any questions or objections 25 regarding his --</p> <p style="text-align: right;">Page 20</p>
<p>1 MR. STEWART: Thirty-five years. 2 MR. CLAWSON: Do you hold any professional 3 licenses or belong to any professional organizations? 4 MR. STEWART: Yes. I'm licensed in six states, 5 including the state of Utah. And I'm the lead on many 6 national environmental engineering committees. 7 MR. CLAWSON: Have you ever testified as an 8 expert witness before? 9 MR. STEWART: Yes. I've testified in federal 10 court, state court, and in front of the U.S. Congress. 11 MR. CLAWSON: Have you testified before any oil 12 and gas commissions? 13 MR. STEWART: Yes. I've testified in front of 14 the Colorado Oil and Gas Conservation Commission. 15 MR. CLAWSON: Are you familiar with Westwater's 16 UIC application and the nature of the formation water in 17 the Wingate Sandstone and the water to be injected into 18 the Harley Dome well? 19 MR. STEWART: Yes, I am very familiar with that. 20 MR. CLAWSON: I'd ask that Dr. Stewart be 21 recognized as an expert in the present matter for 22 purposes of water chemistry and compatibility of the 23 formation and produced water. 24 CHAIRMAN JOHNSON: Ms. Lewis, do you have any 25 questions or objections?</p> <p style="text-align: right;">Page 19</p>	<p>1 MR. SHEA: No. We consent that he's an expert. 2 Just wanting to make sure his data is what we can trace. 3 CHAIRMAN JOHNSON: Okay. We will be getting 4 into that. 5 MR. SHEA: All right. Thank you. 6 CHAIRMAN JOHNSON: Does the Board have any 7 questions or objections? 8 Then we'll recognize Dr. Stewart as an expert 9 for purposes of the hearing. 10 MR. CLAWSON: Thank you very much. 11 Is Westwater Farms, LLC, a Utah limited 12 liability company? 13 MR. STEWART: Yes. 14 MR. CLAWSON: Is it in good standing? 15 MR. STEWART: Yes. 16 MR. CLAWSON: Where is its principal place of 17 business? 18 MR. STEWART: Cisco, Utah. 19 MR. CLAWSON: And is it qualified to conduct 20 business in Utah? 21 MR. STEWART: Yes. 22 MR. CLAWSON: Now I'd refer you to the exhibit 23 marked 1-1. Are you familiar with this exhibit? Have 24 you examined it? 25 MR. STEWART: Yes, I have.</p> <p style="text-align: right;">Page 21</p>

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<p>1 MR. CLAWSON: Can you please tell us what this 2 picture is and what it shows. 3 MR. STEWART: It's an exhibit of the state of 4 Utah -- a picture of the state of Utah with the general 5 roads, river system that -- 6 MR. JENSEN: I don't know that we have this 7 exhibit, Mr. Clawson. 8 MR. SHEA: We don't, either. 9 CHAIRMAN JOHNSON: Where did you get it, Sam? 10 MR. QUIGLEY: It was in our packet. 11 CHAIRMAN JOHNSON: Okay. Give us a minute. Let 12 us find that. 13 MR. SHEA: Can we get a copy? 14 MR. CLAWSON: You know, I don't have another set 15 of copies. 16 MS. CARTER: How many copies are needed? 17 MR. SHEA: Just one. 18 MS. CARTER: I'll get one. 19 MR. SHEA: Thank you. 20 CHAIRMAN JOHNSON: Okay. I believe we have 21 enough copies spread around now. 22 I'm sorry. Go ahead. 23 MR. CLAWSON: Okay. We're looking at 24 Exhibit 1-1. 25 MR. STEWART: That's a picture of Utah. It has</p> <p style="text-align: right;">Page 22</p>	<p>1 bit of information. 2 The white square in the center of this exhibit 3 is the area that shows the private land around that 4 Westwater exit. It shows the ownership of that. It also 5 shows the ownership of the various leasing rights, as 6 well as the helium reserve that's on the BLM land. 7 MR. CLAWSON: And is the white-colored section, 8 are those the -- is that the northeast quarter of Section 9 10? 10 MR. STEWART: Yes, it is. 11 MR. CLAWSON: And are those the subject lands? 12 MR. STEWART: Yes. 13 MR. CLAWSON: Does this show the surface owners 14 and the mineral owners within a half-mile radius of the 15 well? 16 MR. STEWART: It does, and the other private 17 land owners, Mid-America Pipeline. The rest are surface 18 or mineral right owners. 19 MR. CLAWSON: And who are those? 20 MR. STEWART: One is the state land, BLM, and 21 then Mid-America. 22 MR. CLAWSON: Does Westwater Farms own the 23 portions of the surface in the northeast quarter? 24 MR. STEWART: Yes, it does. 25 MR. CLAWSON: Does it own all of the northeast</p> <p style="text-align: right;">Page 24</p>
<p>1 the location of the injection well in Harley Dome 1. 2 MR. CLAWSON: Is that over by the Colorado 3 border? 4 MR. STEWART: Yes, it is. 5 MR. CLAWSON: Okay. Now, I'd refer you to 6 Exhibit 1- -- well, it's 1-2. It's the second page of 7 Exhibit 1. 8 MR. STEWART: This is -- 9 MR. CLAWSON: First of all, are you familiar 10 with this exhibit, and have you examined it? 11 MR. STEWART: Yes, I have. 12 MR. CLAWSON: And what is this exhibit, and what 13 does it show? 14 MR. STEWART: This is a topographic map of that 15 same area. So it's zeroing in on that location of the 16 project site, as well as the location of the injection 17 well. 18 MR. CLAWSON: Okay. Now, I'd refer you to 19 Exhibit 2. Are you familiar with this exhibit? Have you 20 examined it? 21 MR. STEWART: Yes, I have. 22 MR. CLAWSON: What is this exhibit, and what 23 does it show? 24 MR. STEWART: This was part of the application 25 for the UIC permit, and so it shows, actually, quite a</p> <p style="text-align: right;">Page 23</p>	<p>1 quarter? 2 MR. STEWART: No. As you can see, there's a 3 little triangle off to the southeast portion of that 4 quarter section owned by Mid-America Pipeline's company. 5 MR. CLAWSON: And are the highways that are -- 6 well, first of all, what are the highways that are shown 7 on the map? 8 MR. STEWART: Old US-6, as well as I-70 going 9 through there. 10 MR. CLAWSON: And are those highways based on 11 rights-of-way only? 12 MR. STEWART: Yes. 13 MR. CLAWSON: And who owns the minerals in the 14 northeast quarter? 15 MR. STEWART: They're owned by others. 16 Westwater Farms does not have any of the mineral rights. 17 MR. CLAWSON: Does the BLM own the minerals in 18 the northeast quarter? 19 MR. STEWART: Yes. 20 MR. CLAWSON: Now I refer you to Exhibit No. 3. 21 Have you examined this exhibit, and are you familiar with 22 it? 23 MR. STEWART: Yes, I am. 24 CHAIRMAN JOHNSON: We're on Exhibit 3 now? 25 MR. CLAWSON: We are. Was there a question?</p> <p style="text-align: right;">Page 25</p>

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<p>1 CHAIRMAN JOHNSON: No, we were just trying to --</p> <p>2 MR. GILL: We're trying to find I-70. And --</p> <p>3 well, may I ask a question?</p> <p>4 CHAIRMAN JOHNSON: Go ahead.</p> <p>5 MR. GILL: The question relates to the center</p> <p>6 white area, the purple marking for the highways. There's</p> <p>7 a -- you've got Highway I-70, and then you've got this</p> <p>8 purple leg that goes over to Highway 6.</p> <p>9 MR. STEWART: Yes.</p> <p>10 MR. GILL: Is that an off ramp?</p> <p>11 MR. STEWART: That's an off ramp and a county</p> <p>12 road.</p> <p>13 MR. GILL: And a county road. Okay.</p> <p>14 CHAIRMAN JOHNSON: All right. Thank you.</p> <p>15 MR. CLAWSON: And those are rights-of-way only.</p> <p>16 Now we're on Exhibit No. 3. Have you examined</p> <p>17 this exhibit? Are you familiar with it?</p> <p>18 MR. STEWART: Yes.</p> <p>19 MR. CLAWSON: And could you please tell us what</p> <p>20 this is and what it shows.</p> <p>21 MR. STEWART: This is also part of the UIC</p> <p>22 application. It shows the well location. And it's a</p> <p>23 survey being done by Tim Keogh out of Moab.</p> <p>24 MR. CLAWSON: Does it show the detail of the</p> <p>25 northeast quarter?</p> <p style="text-align: right;">Page 26</p>	<p>1 MR. CLAWSON: It's the next letter in Exhibit 5?</p> <p>2 MR. STEWART: Yes.</p> <p>3 MR. CLAWSON: In connection with the BLM's</p> <p>4 concerns and protest, what is Westwater Farms going to do</p> <p>5 to ensure that gases are not produced because of the</p> <p>6 injection?</p> <p>7 MR. STEWART: The only way that microbiology can</p> <p>8 form that hydrogen sulfide, one, it has to have sulfates,</p> <p>9 which are in the formation. The other thing it has to</p> <p>10 have is an organic food source. So we're removing all</p> <p>11 organics prior to injection just to make sure of that.</p> <p>12 We're also, then, treating the water with a</p> <p>13 biocide. So before it goes down, it will have a biocide</p> <p>14 that would control any organics that might be present --</p> <p>15 or any bacteria that might be present.</p> <p>16 MR. CLAWSON: Will Westwater Farms be able to</p> <p>17 monitor the condition of the water in the reservoir to</p> <p>18 make sure the gas is not being produced?</p> <p>19 MR. STEWART: Yes, we will.</p> <p>20 MR. CLAWSON: Okay. Were any other protests</p> <p>21 filed?</p> <p>22 MR. STEWART: There were two other protests, one</p> <p>23 by Living Waters, and one by Mr. Love.</p> <p>24 MR. CLAWSON: Did the Fish and Wildlife Service</p> <p>25 also file a letter?</p> <p style="text-align: right;">Page 28</p>
<p>1 MR. STEWART: Yes, it does.</p> <p>2 MR. CLAWSON: Did the BLM protest the UIC</p> <p>3 application in connection with the Division's earlier</p> <p>4 publication in the informal proceeding?</p> <p>5 MR. STEWART: Yes, it did.</p> <p>6 MR. CLAWSON: Is the letter filed by the BLM</p> <p>7 part of this package of exhibits?</p> <p>8 MR. STEWART: Yes, it is.</p> <p>9 MR. CLAWSON: Can you please tell us what</p> <p>10 exhibit it is?</p> <p>11 MR. STEWART: That would be Exhibit 5.</p> <p>12 MR. CLAWSON: What was the basis of the BLM</p> <p>13 protest?</p> <p>14 MR. STEWART: They were concerned about the --</p> <p>15 as you can see on that one exhibit that had the helium</p> <p>16 located there, they were concerned that the helium --</p> <p>17 that this injection well would have sulfate bacteria and</p> <p>18 form sulfuric acid, which would sour the gas -- or</p> <p>19 hydrogen sulfide. So they were very concerned that this</p> <p>20 injection well had the potential to sour their gas and</p> <p>21 render that helium nonusable.</p> <p>22 So we had a very -- we met with them, went</p> <p>23 through it, went through the geology. And subsequent to</p> <p>24 that, they pulled their objection, which is the next</p> <p>25 letter.</p> <p style="text-align: right;">Page 27</p>	<p>1 MR. STEWART: They filed a letter. It was not a</p> <p>2 letter of protest. It was more of a letter explaining</p> <p>3 there were endangered fish on the Colorado River, which</p> <p>4 we were very well aware of.</p> <p>5 We had various conversations with U.S. Fish and</p> <p>6 Wildlife attempting to satisfy their concerns, which we</p> <p>7 did. That resulted in a baseline study, where we went</p> <p>8 through -- we had discussions with them before we did it.</p> <p>9 They agreed with what we were proposing. And essentially</p> <p>10 what we were doing was looking for seeps in the Wingate</p> <p>11 Formation in Westwater Canyon. So we essentially walked</p> <p>12 the whole canyon. We also interviewed the various BLM</p> <p>13 rangers, asking if there were any seeps, hanging gardens,</p> <p>14 those kinds of things that indicate water is there from</p> <p>15 that formation. And they said that there was no water,</p> <p>16 nor had they ever seen any.</p> <p>17 What we've committed to do is to do that every</p> <p>18 six months while -- for the next three years while the</p> <p>19 injection well is operational, and then continue to do it</p> <p>20 annually past that point.</p> <p>21 MR. CLAWSON: Is the Fish and Wildlife Service</p> <p>22 advisory letter part of the Board's hearing exhibits?</p> <p>23 MR. STEWART: Yes, it is.</p> <p>24 MR. CLAWSON: And which exhibit is that?</p> <p>25 MR. STEWART: Oh, Exhibit 6.</p> <p style="text-align: right;">Page 29</p>

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<p>1 MR. CLAWSON: And is there also another letter</p> <p>2 from Stewart Consulting back to the Forest -- or the Fish</p> <p>3 and Wildlife Service regarding their concerns?</p> <p>4 MR. STEWART: Yes. We wrote them a letter</p> <p>5 October 4 -- actually, to Mr. Hill -- responding to that.</p> <p>6 But we've also had numerous conversations with them. And</p> <p>7 we've actually filed another letter with them showing the</p> <p>8 results of that baseline survey.</p> <p>9 MR. CLAWSON: And are those contained in</p> <p>10 Exhibit 6?</p> <p>11 MR. STEWART: Yes.</p> <p>12 MR. CLAWSON: Okay.</p> <p>13 MR. GILL: Can I ask something about those</p> <p>14 letters?</p> <p>15 CHAIRMAN JOHNSON: Mr. Gill.</p> <p>16 MR. GILL: The letters seem to be inconsistent</p> <p>17 in one matter; and that is, one of them -- I believe the</p> <p>18 BLM says that the dip is updip to the southeast. And</p> <p>19 then the letter from the Fish and Wildlife says that the</p> <p>20 dip is to the northeast. At some point, would you be</p> <p>21 kind enough to clarify what the actual dip is and if</p> <p>22 there's some --</p> <p>23 MR. CLAWSON: Actually, Mr. Allin will be going</p> <p>24 through that.</p> <p>25 MR. GILL: Will you make sure that's covered,</p> <p style="text-align: right;">Page 30</p>	<p>1 if something goes down in the plant, I've got to be able</p> <p>2 to put the water somewhere.</p> <p>3 But the reality is that this facility is going</p> <p>4 to be a state-of-the-art facility. I'm one of the</p> <p>5 national experts. I work with the National Academy of</p> <p>6 Science on produced water. And this is a</p> <p>7 state-of-the-art facility. We are investing millions of</p> <p>8 dollars into this facility to essentially allow for</p> <p>9 recycling this water.</p> <p>10 The water that we'll produce will be a very high</p> <p>11 quality water. It will be able to be discharged, if</p> <p>12 needed, to supplement river flows. It can be used as a</p> <p>13 frac water, or as a drilling water makeup water. It can</p> <p>14 be used for agriculture purposes. So there are all kinds</p> <p>15 of uses for this water.</p> <p>16 And there was a recent report by the National</p> <p>17 Academy of Science on the use of produced water as a new</p> <p>18 resource. And that's my area of expertise.</p> <p>19 I testified in both Congress as well as the</p> <p>20 National Academy on this. So one of the things we're</p> <p>21 trying to do is put in a facility that will be very</p> <p>22 useful to domestic energy production.</p> <p>23 The constraint to domestic energy production is</p> <p>24 produced water. You can only generate as much energy as</p> <p>25 you can get rid of the water. What we're doing is</p> <p style="text-align: right;">Page 32</p>
<p>1 please?</p> <p>2 CHAIRMAN JOHNSON: Go ahead.</p> <p>3 MR. CLAWSON: Did you meet with Living Rivers to</p> <p>4 address its concerns?</p> <p>5 MR. STEWART: Yes, I did.</p> <p>6 MR. CLAWSON: Can you please describe that</p> <p>7 process?</p> <p>8 MR. STEWART: I met with Mr. Weisheit on the</p> <p>9 Saturday after Thanksgiving. He was visiting family in</p> <p>10 Boulder. And so we had a very pleasant meeting for a</p> <p>11 couple of hours.</p> <p>12 I provided him with all the information that I</p> <p>13 had, both for this, as well as information on the</p> <p>14 Conditional Use Permit.</p> <p>15 We talked through the issue. And, you know, one</p> <p>16 of the things that is interesting about this is that what</p> <p>17 we're really doing is building a recycling facility. The</p> <p>18 injection well is going to be used initially for produced</p> <p>19 water. Once the recycling facility is up and running,</p> <p>20 then it will be used for brine. But we have a brine</p> <p>21 management program where we're actually going to make</p> <p>22 chemistry from the brine.</p> <p>23 So this facility will have an injection well</p> <p>24 that won't be used. The injection well will be a backup,</p> <p>25 because I've got to be able to take produced water. And</p> <p style="text-align: right;">Page 31</p>	<p>1 removing that constraint. Because as this well shows, I</p> <p>2 can only put in about 6500 barrels a day into this</p> <p>3 formation based on the pressures. If I have a recycle</p> <p>4 facility, I remove that constraint. And so what we're</p> <p>5 trying to do is come up with a state-of-the-art facility</p> <p>6 in Westwater, Utah, to match that need.</p> <p>7 MR. CLAWSON: Did you meet with Bill Love to</p> <p>8 address his concerns?</p> <p>9 MR. STEWART: I tried to contact Mr. Love. We</p> <p>10 never did connect.</p> <p>11 MR. CLAWSON: Did he file a response to</p> <p>12 Westwater's Request for Agency Action?</p> <p>13 MR. STEWART: No.</p> <p>14 MR. CLAWSON: Now, I'd refer you to Exhibit</p> <p>15 No. 4.</p> <p>16 CHAIRMAN JOHNSON: Go ahead.</p> <p>17 MR. CLAWSON: Is this the Request for Agency</p> <p>18 Action that has been filed in this cause?</p> <p>19 MR. STEWART: Yes, it is.</p> <p>20 MR. CLAWSON: Toward the back of the Request</p> <p>21 there's a list of names and addresses.</p> <p>22 Is this a certificate of mailing for the Request</p> <p>23 for Agency Action?</p> <p>24 MR. STEWART: Yes, it is.</p> <p>25 MR. CLAWSON: And what does it show?</p> <p style="text-align: right;">Page 33</p>

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<p>1 MR. STEWART: It shows all the owners within a</p> <p>2 half mile radius as well as the operators and surface</p> <p>3 owners and the people who are protesting the UIC permit.</p> <p>4 MR. CLAWSON: How did you determine what parties</p> <p>5 to include on this list?</p> <p>6 MR. STEWART: Just from that. They either</p> <p>7 have -- they're either with UDOGM or with Grand County,</p> <p>8 they own property, or they've protested this.</p> <p>9 MR. CLAWSON: Was the Request for Agency Action</p> <p>10 mailed to everyone on this list?</p> <p>11 MR. STEWART: Yes.</p> <p>12 MR. CLAWSON: You've already spoken as to</p> <p>13 Westwater's plans for the properties in and near the</p> <p>14 subject lands. And numerous times you've referred to</p> <p>15 "produced water."</p> <p>16 Would you please tell us what "produced water"</p> <p>17 is?</p> <p>18 MR. STEWART: "Produced water" is the water that</p> <p>19 comes up with the oil and gas. So it either comes from</p> <p>20 coalbed methane, it comes from tight gas, or it comes</p> <p>21 from oil wells. That's what "produced water" is.</p> <p>22 MR. CLAWSON: What will be the sources of the</p> <p>23 water to be injected?</p> <p>24 MR. STEWART: That's going to be produced water.</p> <p>25 MR. CLAWSON: From fields in Utah?</p> <p style="text-align: right;">Page 34</p>	<p>1 MR. JENSEN: And if it has frac water evidence,</p> <p>2 you're going to have the capability to remove that?</p> <p>3 MR. STEWART: We segregate that particular load.</p> <p>4 And we would charge them additional money for doing that.</p> <p>5 MR. JENSEN: So that would not go into the</p> <p>6 reservoir?</p> <p>7 MR. STEWART: No.</p> <p>8 MR. JENSEN: Okay. Thank you.</p> <p>9 MR. CLAWSON: So to state it plainly, it's not</p> <p>10 the purpose of this injection well to take frac water?</p> <p>11 MR. STEWART: No, it is not.</p> <p>12 MR. CLAWSON: I'd refer you to Exhibit No. 11.</p> <p>13 CHAIRMAN JOHNSON: Excuse me, Mr. Clawson.</p> <p>14 Go ahead, Mr. Gill.</p> <p>15 MR. GILL: You've stated that you have a</p> <p>16 state-of-the-art facility. Are you intending at some</p> <p>17 point in your presentation to discuss what that means?</p> <p>18 MR. STEWART: I can.</p> <p>19 MR. CLAWSON: Well --</p> <p>20 MR. GILL: If you would plan that in your</p> <p>21 presentation, I'd appreciate it.</p> <p>22 MR. CLAWSON: We're fine to do that. But the</p> <p>23 Board is being asked to approve the Harley Dome No. 1 as</p> <p>24 a UIC injection well, and it's the recycling part of the</p> <p>25 plant. And the program really -- except when it comes</p> <p style="text-align: right;">Page 36</p>
<p>1 MR. STEWART: From fields in Utah and Colorado.</p> <p>2 It's purely a transportation thing. It's the cost of how</p> <p>3 much it costs me to get rid of that, a barrel of produced</p> <p>4 water. So it becomes a transportation issue.</p> <p>5 MR. CLAWSON: Will any of the water be</p> <p>6 associated with hydrofracking operations?</p> <p>7 MR. STEWART: No.</p> <p>8 MR. CLAWSON: So you're not going to take</p> <p>9 fracking back flow water?</p> <p>10 MR. STEWART: You can sometimes get flow back</p> <p>11 associated with that water, produced water. If an</p> <p>12 operator combines the two, we know it immediately. If</p> <p>13 you have frac water mixed in with produced water, all</p> <p>14 you've got to do is shake it up. It will foam. So we</p> <p>15 know when frac water is there and when it's not there.</p> <p>16 We have a different treatment technology for</p> <p>17 frac water. The important thing for the injection well</p> <p>18 is that we -- the reason it foams is because it has</p> <p>19 surfactants. So what we do is we remove the organics,</p> <p>20 which is a surfactant. So the formation would never see</p> <p>21 that material.</p> <p>22 MR. JENSEN: So let me understand, Mr. Stewart.</p> <p>23 If a truck load of water comes in, you're going to test</p> <p>24 that.</p> <p>25 MR. STEWART: Absolutely.</p> <p style="text-align: right;">Page 35</p>	<p>1 to, perhaps, testing and preparing the water for</p> <p>2 injection, you know -- really isn't something that we're</p> <p>3 asking the Board to approve.</p> <p>4 MR. GILL: That's a good comment. The questions</p> <p>5 would go more toward --</p> <p>6 MR. CLAWSON: Actually, now is a good point for</p> <p>7 Dr. Stewart to explain maybe the scope and --</p> <p>8 MR. GILL: Dr. Stewart, if this is a backup, it</p> <p>9 presupposes that the state-of-the-art facility is going</p> <p>10 to accomplish what it needs to.</p> <p>11 What are the stages, or what is it you are going</p> <p>12 to be using in that plant generically and just generally?</p> <p>13 Reverse osmosis, or what is it you are going to do? And</p> <p>14 then particularly, what are you going to do about any of</p> <p>15 the small hydrocarbon chains that are on that? I'd</p> <p>16 appreciate knowing that.</p> <p>17 MR. PAYNE: Could I ask a question, just a</p> <p>18 clarifying question?</p> <p>19 This plan is not a necessary pretreatment step</p> <p>20 in your process, right? It merely represents an</p> <p>21 opportunity. So I don't know if that clarifies this,</p> <p>22 but --</p> <p>23 MR. GILL: And when experts like you come before</p> <p>24 the Board, it's important to teach us a little bit. And</p> <p>25 so please be aware that this may be something that is not</p> <p style="text-align: right;">Page 37</p>

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<p>1 material. But it is a little -- this is a new 2 technology. It's a first impression type. I don't know 3 anyone else who is doing this yet in Utah. 4 MR. STEWART: No, there is no one else doing it. 5 MR. GILL: Anyone else in the U.S. 6 MR. STEWART: That's correct. Nobody else in 7 the U.S. 8 MR. JENSEN: But for purposes of this hearing, 9 we have to assume that your facility doesn't work. And 10 there's going to be X amount -- whatever this reservoir 11 will take -- of production water that's going to go in. 12 It seems to me that's what we have to -- that's what we 13 have to assume. 14 MR. STEWART: That's correct. 15 MR. JENSEN: We hope that everything goes well 16 for you in the other facet. But I think we've got to be 17 satisfied that -- assuming your facility doesn't work -- 18 that we have the -- we have the appropriate measures in 19 place to make sure -- assuming that we approve this 20 application -- to make sure that we don't have the 21 environmental contamination and the leaching issue. To 22 me, that's what's before this Board. 23 MR. STEWART: That's correct. So let me explain 24 the process. 25 The first part of the process is to recover any</p> <p style="text-align: right;">Page 38</p>	<p>1 is the lithium ion batteries. The United States does not 2 have very much lithium. So we have to go to Bolivia or 3 China for our lithium, which are not always friendly to 4 what we're trying to achieve. 5 So one of the things we are doing is we're 6 capturing the lithium, and we sell that off as a 7 by-product from this facility. 8 The next thing we do is we put it through what's 9 called a ceramic microfilter. This is where my patent 10 comes into play. I have a patent pending on this 11 particular process -- one patent pending and another 12 patent granted in 2002. 13 Essentially, this removes any of the heavy 14 metals. It removes any of the organics that are left. 15 And that goes off site, either as a solid waste, or as, 16 again, a by-product if we have enough lithium in it. 17 We then take that material, put it through an 18 activated carbon. Then we take out -- we possibly will 19 have an ion exchange, but we end up with an RO, so 20 reverse osmosis. We're going to remove all the salt. 21 So we get our -- in our pilot plant, our normal 22 effluent had a TDS somewhere between 50 to 100 parts per 23 million. It was very good water. It had no organics in 24 it. The salts that were there were just sodium chloride. 25 So we take that water, we can then blend it.</p> <p style="text-align: right;">Page 40</p>
<p>1 oils. So we put in a reverse breaker into the -- a lot 2 of the oils that we get are emulsified. So we'll put a 3 reverse breaker into that oil stream, and we'll 4 physically separate oils from the water. 5 The next step that we go to, then, is aeration. 6 One of the things that we do on this facility is we 7 capture all our VOCs. So we don't let any VOCs escape 8 from the process. It's a completely closed system. We 9 capture those VOCs, and we actually use them for energy 10 purposes. So we'll burn them and use it for heat 11 generation. 12 The next thing we do is we aerate it. So we're 13 going to strip a lot of the VOCs, like benzene, toluene 14 ethylbenzene, xylenes. We're going to strip those 15 through an aeration system. 16 Past that, then we go into what's called a 17 walnut shell filter. So walnut shells have been around 18 for about 30 years -- several patents on those. And we 19 use the walnut shell to remove things like heavy oils, 20 tars, paraffins, asphaltings. That is then removed from 21 the system. Now the water is fairly clean. 22 One of the things that produced water has it in 23 it is Lithium. And it has a tremendous amount of 24 Lithium, actually, about 100 to 200 parts per million. 25 Lithium is -- we all use Smartphones. Lithium</p> <p style="text-align: right;">Page 39</p>	<p>1 Some of the fracking companies like to have a higher TDS, 2 so they like to have something around ten to 15,000 parts 3 per million. Some of them don't want any TDS. We can 4 make it either way. We can custom blend that water. 5 The only part that's left, then, is the brine. 6 So that's a salt brine. Only has salt in it, mainly 7 sodium chloride. So we take that sodium and the 8 chloride, and we put a DC circuit between the two, and we 9 pull it through a membrane. By doing that, I can either 10 make a hypochlorous acid, or a hydrochloric acid. And I 11 can either make a sodium hydroxide or a sodium carbonate. 12 Sodium carbonate is actually a carbon negative process. 13 So we will likely make sodium carbonate because it's used 14 in glass manufacturing. And there's a glass plant in 15 Greeley, Colorado, that is more than willing to buy the 16 sodium carbonate that we make. The hypochlorous acid is 17 bleach. So we use that as a biocide. 18 So these are the products that we make out of 19 this. And this facility -- there are other produced 20 water treatment facilities. None of them go to the 21 extent that we do. We have an exclusiveness on the brine 22 treatment, and I own the patent on the ceramic piece. So 23 this facility is, like I said, the first state-of-the-art 24 facility that will do this kind of produced water 25 treatment in the U.S. -- in the world, actually.</p> <p style="text-align: right;">Page 41</p>

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<p>1 MR. GILL: Do you have any magnesium?</p> <p>2 MR. STEWART: We do have a little bit of</p> <p>3 magnesium, but that comes out with the ceramics.</p> <p>4 We also have barium, and we have to get that</p> <p>5 barium out. We cannot -- even if we don't have the brine</p> <p>6 treatment yet, we've got to get the barium out first</p> <p>7 because we don't want that going down the well. It makes</p> <p>8 barium sulfate, and you can't get rid of it.</p> <p>9 MR. HAROUNY: What is actually going down the</p> <p>10 well, and why do you need to inject anything if</p> <p>11 everything can be used?</p> <p>12 MR. STEWART: I need it as a backup. I have</p> <p>13 master service agreements with oil companies. They don't</p> <p>14 look kindly on me when I say, "Gee, I'm closed today."</p> <p>15 That won't go over. So I have to have some place to put</p> <p>16 the water.</p> <p>17 MR. HAROUNY: So the facility will be capable of</p> <p>18 treating 6500 barrels a day or more?</p> <p>19 MR. STEWART: 15,000 barrels per day for the</p> <p>20 first phase of that facility. It can be expanded to</p> <p>21 60,000 barrels a day.</p> <p>22 MR. HAROUNY: Does any part of the facility</p> <p>23 require ponds, retaining ponds?</p> <p>24 MR. STEWART: No. There are no ponds associated</p> <p>25 with this facility.</p> <p style="text-align: right;">Page 42</p>	<p>1 MR. GILL: My question is: My understanding is</p> <p>2 that you've got this stand-alone plan. Then you have the</p> <p>3 injection well itself with related facilities.</p> <p>4 MR. STEWART: Correct.</p> <p>5 MR. GILL: Part of those facilities that do come</p> <p>6 into the worst-case scenario is what you are describing</p> <p>7 to me now?</p> <p>8 MR. STEWART: That's correct. And that's in a</p> <p>9 memo where I did the calculation. The Division wanted to</p> <p>10 make sure that we were looking at compatibility of our</p> <p>11 injectate into the reservoir.</p> <p>12 MR. CLAWSON: So this is a good point to segue</p> <p>13 into that further part of our presentation.</p> <p>14 MR. GILL: It would be a really good point,</p> <p>15 because I think we're on it. I don't want to tell you</p> <p>16 how to make your case.</p> <p>17 MR. CLAWSON: No, actually that was the next</p> <p>18 thing we were going to do.</p> <p>19 CHAIRMAN JOHNSON: Will you be changing</p> <p>20 witnesses?</p> <p>21 MR. CLAWSON: No. We've qualified Dr. Stewart</p> <p>22 as an expert for the water chemistry. And now I'd like</p> <p>23 him to delve into the aspects of both types of water</p> <p>24 involved in this facility -- or the injection well.</p> <p>25 CHAIRMAN JOHNSON: Okay. Let's go ahead.</p> <p style="text-align: right;">Page 44</p>
<p>1 MR. JENSEN: But your injection limitation is</p> <p>2 6500?</p> <p>3 MR. STEWART: That's correct, based on</p> <p>4 pressures. So we have both -- Dave Allin will address</p> <p>5 that. But that's what we're anticipating right now.</p> <p>6 MR. JENSEN: So if you had an issue with your</p> <p>7 plant, you'd simply have to throttle back the input?</p> <p>8 MR. STEWART: Correct. That's correct.</p> <p>9 MR. GILL: I think Mr. Payne is correct. For</p> <p>10 the purposes of this hearing, it's as if that didn't</p> <p>11 exist.</p> <p>12 MR. STEWART: No. I understand.</p> <p>13 MR. GILL: Or if it does exist, it doesn't work.</p> <p>14 MR. STEWART: Right.</p> <p>15 MR. GILL: It's a worst-case scenario we'll be</p> <p>16 looking at for purposes --</p> <p>17 MR. STEWART: And the injection well has its own</p> <p>18 treatment system. So that injection well is removing the</p> <p>19 organics. We're filtering through different media,</p> <p>20 removing the organics. We sequester the barium, and we</p> <p>21 add a chlorine solution to keep the microbiology at bay.</p> <p>22 MR. GILL: You'll get to testify about that?</p> <p>23 You'll testify about that at that point, or are you</p> <p>24 making that --</p> <p>25 CHAIRMAN JOHNSON: Testify about what?</p> <p style="text-align: right;">Page 43</p>	<p>1 MR. CLAWSON: So let me refer you to Exhibit</p> <p>2 No. 11, which is in the Board's packet for today. And</p> <p>3 also earlier today we filed a packet of three exhibits,</p> <p>4 rebuttal exhibits, because we anticipated these kinds of</p> <p>5 questions, particularly in view of the letter that Living</p> <p>6 Rivers filed last night. So I would also call your</p> <p>7 attention to what's marked as Rebuttal Exhibit No. 1.</p> <p>8 CHAIRMAN JOHNSON: Okay. So first, we're going</p> <p>9 with Exhibit 11, Mr. Clawson?</p> <p>10 MR. CLAWSON: Well, we can start with 11. But I</p> <p>11 want him to be able to talk from both exhibits.</p> <p>12 CHAIRMAN JOHNSON: Okay.</p> <p>13 MR. CLAWSON: It will flow better that way.</p> <p>14 CHAIRMAN JOHNSON: Go ahead.</p> <p>15 MR. CLAWSON: So with respect to Exhibit No. 11,</p> <p>16 are you familiar with this exhibit, and have you examined</p> <p>17 it?</p> <p>18 MR. STEWART: Yes, I have.</p> <p>19 MR. CLAWSON: Can you just briefly tell us what</p> <p>20 it is.</p> <p>21 MR. STEWART: It's the test results from</p> <p>22 Halliburton during the drilling of the injection well.</p> <p>23 MR. CLAWSON: Okay. Now I'd refer you to</p> <p>24 Rebuttal Exhibit No. 1.</p> <p>25 MR. STEWART: Yes.</p> <p style="text-align: right;">Page 45</p>

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<p>1 MR. CLAWSON: Are you familiar with this</p> <p>2 exhibit, and have you examined it?</p> <p>3 MR. STEWART: Yes.</p> <p>4 MR. CLAWSON: Can you please tell us what this</p> <p>5 exhibit is?</p> <p>6 MR. STEWART: This is a modeling that we had to</p> <p>7 do to make sure that the injection water is going to be</p> <p>8 compatible with the formation water. So what you're</p> <p>9 doing here, we had -- as I said before, we've tested --</p> <p>10 we had a pilot on site for eight weeks, and we tested</p> <p>11 that water every day. We know where the water came from,</p> <p>12 from what wells, from what companies. And we tested</p> <p>13 water, both from the Uinta Basin as well as the Piceance</p> <p>14 Basin. And in that, we came up with what we call an</p> <p>15 "average water quality" for that injectate. So that's in</p> <p>16 this memo.</p> <p>17 When we run -- then we run MINTEQ, and that's an</p> <p>18 EPA program that predicts solubility of chemistry and</p> <p>19 natural waters. And what we find is that, of course, we</p> <p>20 get a barium sulfate. We get a barium sulfate, we get a</p> <p>21 chrysotile and dolomite. Dolomite is very easy to</p> <p>22 handle. I can just put an acid down the well and get</p> <p>23 that to redissolve. Barium sulfate and chrysotile does</p> <p>24 not do that. So you've got to sequester that.</p> <p>25 So we worked with Baker Petrolite, and they have</p> <p style="text-align: right;">Page 46</p>	<p>1 in the Wingate Sandstone?</p> <p>2 MR. STEWART: With treatment it is.</p> <p>3 MR. CLAWSON: Okay. Now I'd refer you to</p> <p>4 Exhibits 1 through 6.</p> <p>5 MR. JENSEN: May I ask before you go, Mr.</p> <p>6 Clawson?</p> <p>7 MR. CLAWSON: Sure.</p> <p>8 MR. JENSEN: You've got a truck that comes in,</p> <p>9 and let's say it's got 80 or 100 barrels on it. And you</p> <p>10 are taking a quick sample.</p> <p>11 MR. STEWART: Correct.</p> <p>12 MR. JENSEN: And let's say that you've got</p> <p>13 issues with that, and it's got to have whatever</p> <p>14 treatment.</p> <p>15 How do you keep that separate from other water?</p> <p>16 Because there's trucks backed up. So what's happening?</p> <p>17 MR. STEWART: We have a bunch of -- we have nine</p> <p>18 small tanks that can take a tanker load. And before they</p> <p>19 go up to the large oil water separator where we're</p> <p>20 putting in, they go into these small tanks. And so</p> <p>21 typically, they'll just do that.</p> <p>22 But if the operator sees something -- he'll take</p> <p>23 a quick sample of it. If he sees something amiss, he's</p> <p>24 going to put it into a tank. That is going to sit there</p> <p>25 until we figure out what to do with it.</p> <p style="text-align: right;">Page 48</p>
<p>1 suggested several sequestering agents. They are doing</p> <p>2 some additional testing as we speak. But it's our</p> <p>3 anticipation that -- and they have every confidence that</p> <p>4 they are going to come up with the right sequestering</p> <p>5 agent. And then we will inject that at whatever dose</p> <p>6 they recommend, plus the biocide.</p> <p>7 MR. JENSEN: And again, we're talking about raw</p> <p>8 water received that hasn't gone through your facility?</p> <p>9 MR. STEWART: That's correct. It's gone through</p> <p>10 the treatment process to remove the organics. It's gone</p> <p>11 through the oil separation piece.</p> <p>12 MR. JENSEN: Which you'll do in any event.</p> <p>13 MR. STEWART: That's correct. All of that is</p> <p>14 being done in any event.</p> <p>15 MR. JENSEN: Okay. Thank you.</p> <p>16 MR. CLAWSON: So when produced water is</p> <p>17 transported to the proposed injection well, it will be</p> <p>18 tested and analyzed and treated before it will be</p> <p>19 injected?</p> <p>20 MR. STEWART: Oh, absolutely. The last thing we</p> <p>21 want to do is cement our well. I mean, that's our</p> <p>22 livelihood. So we're going to check that chemistry all</p> <p>23 the time.</p> <p>24 MR. CLAWSON: In your expert opinion, is the</p> <p>25 water to be injected compatible with the formation water</p> <p style="text-align: right;">Page 47</p>	<p>1 MR. JENSEN: Otherwise, it will become</p> <p>2 co-mingled in your process.</p> <p>3 MR. STEWART: That's correct.</p> <p>4 MR. JENSEN: Thank you.</p> <p>5 MR. CLAWSON: Okay. I'd refer you to Exhibits 1</p> <p>6 through 6, 11, and Rebuttal Exhibit No. 1.</p> <p>7 Were they prepared by Westwater in connection</p> <p>8 with this proceeding, or in the regular course of</p> <p>9 Westwater's business activities, or are they a part of</p> <p>10 the public record in this proceeding?</p> <p>11 MR. STEWART: Yes.</p> <p>12 MR. CLAWSON: I ask that Exhibits 1 through 6,</p> <p>13 11, and Rebuttal Exhibit No. 1 be admitted.</p> <p>14 CHAIRMAN JOHNSON: Ms. Lewis, any objections?</p> <p>15 MS. LEWIS: No objections.</p> <p>16 CHAIRMAN JOHNSON: Mr. Shea?</p> <p>17 MR. SHEA: Can I ask a foundational question</p> <p>18 again?</p> <p>19 CHAIRMAN JOHNSON: Yes.</p> <p>20 MR. SHEA: Is there a way in which the precise</p> <p>21 well that these came from can be known, and is that part</p> <p>22 of the public record?</p> <p>23 MR. STEWART: It's not part of the public</p> <p>24 record. We have absolutely QA/QC data to know where</p> <p>25 these samples came from.</p> <p style="text-align: right;">Page 49</p>

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<p>1 MR. SHEA: QA/QC?</p> <p>2 MR. STEWART: Quality Assurance/Quality Control</p> <p>3 data.</p> <p>4 MR. SHEA: And is that on a GPS basis --</p> <p>5 MR. STEWART: No.</p> <p>6 MR. SHEA: -- or what's the combination?</p> <p>7 MR. STEWART: I can get that information for</p> <p>8 you. I don't have it with me. But it comes from -- the</p> <p>9 oil operator tells us where this is coming from. We</p> <p>10 don't go out and independently verify that.</p> <p>11 MR. SHEA: The only thing that I'm trying to</p> <p>12 raise to the Board is whether or not these samples truly</p> <p>13 are able, even with an expert opinion, to say that</p> <p>14 they're compatible with the Westwater site. I think it's</p> <p>15 from a model. Models can be incorrect. And we're being</p> <p>16 asked to assume something that I don't think factually</p> <p>17 can be testified to at this point.</p> <p>18 I think there are ways in which data could be</p> <p>19 generated so the similarities or dissimilarities could be</p> <p>20 determined. But so far, I haven't seen the foundation</p> <p>21 for that in the evidence that's been put into the record</p> <p>22 to date.</p> <p>23 MR. JENSEN: It seems to me we ought to let Mr.</p> <p>24 Clawson move forward, and you can handle that in cross.</p> <p>25 MR. SHEA: Thank you.</p> <p style="text-align: right;">Page 50</p>	<p>1 But I agree with Mr. Clawson that we can get</p> <p>2 into that as we discuss the testing that will be done.</p> <p>3 MR. JENSEN: I think that's proper cross. I</p> <p>4 think we ought to let Mr. Clawson go forward with his</p> <p>5 direct examination.</p> <p>6 MR. PAYNE: Perhaps we could just clarify now.</p> <p>7 I'm looking at this rebuttal exhibit. It says</p> <p>8 "Formation Water W201" or "Formation Water W181." Are</p> <p>9 these actual waters? They're not modeled water</p> <p>10 composition. Let's just clear that up now.</p> <p>11 These are some representative samples of</p> <p>12 something that would be delivered potentially to your</p> <p>13 facility?</p> <p>14 MR. STEWART: Those are the formation waters.</p> <p>15 What you see there --</p> <p>16 MR. PAYNE: Are they waters that would be</p> <p>17 delivered to your facility, or waters that you</p> <p>18 encountered in your injection well?</p> <p>19 MR. STEWART: In the injection well.</p> <p>20 MR. PAYNE: Okay.</p> <p>21 MR. STEWART: If you look at the third page of</p> <p>22 this rebuttal, it says, "Representative chemistry of</p> <p>23 injected water after oil removal." So what you see there</p> <p>24 are eight samples. We actually have more samples than</p> <p>25 that. But we use these eight samples as a means of</p> <p style="text-align: right;">Page 52</p>
<p>1 MR. JENSEN: You are alerted to his --</p> <p>2 MR. CLAWSON: I am. And I think he's fine to</p> <p>3 ask those types of questions on cross-examination.</p> <p>4 I would point out that he did just testify that</p> <p>5 the water will be tested at the facility when it comes</p> <p>6 in. And so yeah, it's important to know where it came</p> <p>7 from. But the water is not going down the hole until</p> <p>8 they know what it is and it's been treated.</p> <p>9 MR. JENSEN: And that was his testimony.</p> <p>10 MR. CLAWSON: That was his testimony. But he's</p> <p>11 welcome to cross-examine on that point. The question</p> <p>12 before the Board is --</p> <p>13 CHAIRMAN JOHNSON: Maybe I don't understand your</p> <p>14 objection, Mr. Shea. Were you talking about the water</p> <p>15 samples that were used for Rebuttal Exhibit 1?</p> <p>16 MR. SHEA: In Exhibit 1, yeah, the rebuttal.</p> <p>17 CHAIRMAN JOHNSON: Rebuttal Exhibit 1.</p> <p>18 And you are just questioning where that water</p> <p>19 was, or where that water came from that was used in</p> <p>20 creating the modeling?</p> <p>21 MR. SHEA: I concur that it's a model.</p> <p>22 What I disagree with is the source of the</p> <p>23 modeling data that would be the basis for making the</p> <p>24 general statement that it's the same as would be found in</p> <p>25 the basins that we're talking about.</p> <p style="text-align: right;">Page 51</p>	<p>1 coming up with our estimated concentrations that we used</p> <p>2 for the injectate water.</p> <p>3 MR. PAYNE: So what was the source of the raw</p> <p>4 injected water chemistry?</p> <p>5 MR. STEWART: That's the produced water from the</p> <p>6 pilot plant that we ran for eight weeks and we tested</p> <p>7 every day.</p> <p>8 MR. PAYNE: So that was from actual water that</p> <p>9 you had received at your commercial operation, not a</p> <p>10 modeled concentration --</p> <p>11 MR. STEWART: That's correct. The DEQ was</p> <p>12 adamant about this. I mean, we do not have a permit to</p> <p>13 do anything with this water yet. And the County was, as</p> <p>14 well.</p> <p>15 So what we had to do was to bring this water in.</p> <p>16 We had two Baker tanks, brought the water in. We'd</p> <p>17 test -- we'd run it through one Baker tank. We'd take</p> <p>18 our great effluent and put it into the other Baker tank.</p> <p>19 And they'd haul that to a disposal facility. So we had</p> <p>20 eight weeks of running actual samples from the various</p> <p>21 basins.</p> <p>22 CHAIRMAN JOHNSON: Okay. Mr. Clawson, I believe</p> <p>23 you moved to admit those exhibits, didn't you?</p> <p>24 MR. CLAWSON: I did.</p> <p>25 CHAIRMAN JOHNSON: Exhibits 1 through 6 and 11,</p> <p style="text-align: right;">Page 53</p>

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<p>1 and Rebuttal Exhibit 1 -- and noting the objection from 2 Mr. Shea -- we'll admit those.</p> <p>3 MR. CLAWSON: Okay. Thank you very much.</p> <p>4 Now, with respect to the letter that was filed, 5 I guess, with the Board this morning and distributed late 6 last night, I'd like Dr. Stewart -- by Living Rivers -- 7 I'd like Dr. Stewart to address some of the paragraphs in 8 that letter. I think that's probably the easiest way to 9 get through this. And Mr. Shea can cross-examine him on 10 that, as well.</p> <p>11 CHAIRMAN JOHNSON: So we are now talking about 12 the letter dated December 7th. Is that correct?</p> <p>13 MR. CLAWSON: Correct.</p> <p>14 CHAIRMAN JOHNSON: Okay.</p> <p>15 MR. SHEA: Just so I'm clear, can I 16 cross-examine him now, or are we waiting until you've 17 presented your case-in-chief?</p> <p>18 MR. CLAWSON: Why don't we go through the letter 19 because he's going to be testifying as to -- responding 20 to your letter. And you may want to cross-examine him on 21 that, as well.</p> <p>22 MR. SHEA: So to wait --</p> <p>23 MR. CLAWSON: Wait until -- right after I'm done 24 doing this, I'm done with this witness.</p> <p>25 CHAIRMAN JOHNSON: Okay. Then we'll have</p> <p style="text-align: right;">Page 54</p>	<p>1 Can you please address that?</p> <p>2 MR. STEWART: We're using local contractors for 3 the construction of our facility. Again, that's a \$4 1/2 4 million facility. We will hire between four and six 5 employees to operate this facility. And we also pay a 6 fee to Grant County on every barrel that we receive.</p> <p>7 MR. CLAWSON: Under Item No. C, "Bonding and 8 Decommissioning," could you please address the nature of 9 the bond and how you would decommission this well?</p> <p>10 MR. STEWART: The bonding is set by the 11 Division, so we provided whatever bond that they asked 12 for. And our plugging costs we estimated at about 13 14,500. So I think that's the reason for the \$15,000 14 bond.</p> <p>15 Mr. Allin can probably answer that better than I 16 can.</p> <p>17 MR. GILL: Can I interrupt here? Why are you 18 paying a fee to Grand County?</p> <p>19 MR. STEWART: It's part of the Conditional Use 20 Permit.</p> <p>21 MR. CLAWSON: Just by way of clarification, 22 Grand County does have authority over planning and zoning 23 for a facility built in the county dealing with roads and 24 those different issues. And so Grand County is caught 25 up -- or addressing the issues associated with the larger</p> <p style="text-align: right;">Page 56</p>
<p>1 Ms. Lewis ask questions.</p> <p>2 Then Mr. Shea, you can ask questions. Then the 3 Board can ask questions.</p> <p>4 MR. CLAWSON: Normally at this point, I'd be 5 finished. But I think it makes sense to go through this 6 stuff while things are fresh.</p> <p>7 CHAIRMAN JOHNSON: Let's go ahead.</p> <p>8 MR. CLAWSON: Looking at the December 7, 2010, 9 letter from Mr. Shea to the Division of Oil, Gas and 10 Mining, and looking at the second page under, 11 "Geophysical questions and concerns," Item No. A, "Lack 12 of Capital," there's an assertion that "your venture is 13 speculative."</p> <p>14 Could you please let the Board know -- you know, 15 would you please inform the Board as to the level of 16 investment in your financing?</p> <p>17 MR. STEWART: Yes. We have available to us 18 \$7 million. Our plant facility is about a \$4 1/2 million 19 facility. We have plenty of capital.</p> <p>20 MR. CLAWSON: And the injection well is fully 21 funded?</p> <p>22 MR. STEWART: That's correct.</p> <p>23 MR. CLAWSON: Under Item No. B, "Burdens to 24 Grand County," there's an allegation that "there won't be 25 any jobs or economic benefit to Grand County."</p> <p style="text-align: right;">Page 55</p>	<p>1 facility, not just the injection well. And I think --</p> <p>2 MR. JENSEN: It's really the surface facility 3 that gets you in before Grand County.</p> <p>4 MR. CLAWSON: Right. And I think Dr. Stewart 5 can assure the Board that the County understands the 6 primacy of the Board's authority over the UIC injection 7 well. And -- actually, let me ask him.</p> <p>8 Is Grand County causing a problem vis-a-vis 9 approval of the injection well?</p> <p>10 MR. STEWART: No. Their ordinance specifically 11 states that the injection well itself is a state issue. 12 It has nothing to do with the County.</p> <p>13 MR. GILL: Thank you.</p> <p>14 MR. CLAWSON: Nevertheless, they still have to 15 go through planning and zoning.</p> <p>16 Under Item No. D "Electricity," how will the 17 injection well be powered?</p> <p>18 MR. STEWART: We have two on-site generators; 19 plus, we have an agreement with Wirsol. Wirsol is the 20 largest photovoltaic integrator in the world out of 21 Germany. And we're putting in a couple of megawatts 22 there for the facility, mainly because our brine 23 treatment uses DC power. Photovoltaics make DC power, so 24 we don't have to convert it. It makes it a very nice 25 fit. And we can run the rest of the facility off of</p> <p style="text-align: right;">Page 57</p>

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<p>1 photovoltaic.</p> <p>2 MR. CLAWSON: Under Item E, "Chemical Analysis</p> <p>3 of the Produced Water," can you please, again, address</p> <p>4 how Westwater Farms will address the different types of</p> <p>5 water coming into this facility?</p> <p>6 MR. STEWART: Again, we tested -- we've already</p> <p>7 tested it. We will continue to test it. It seems to be</p> <p>8 very consistent in the testing that we've done. I've</p> <p>9 done testing all over the western United States. Each</p> <p>10 basin has its own signature, but within the basin it</p> <p>11 doesn't change very much.</p> <p>12 MR. CLAWSON: And will each truck be tested</p> <p>13 before it's injected?</p> <p>14 MR. STEWART: Yes, it is.</p> <p>15 MR. CLAWSON: So it's a daily sampling, not --</p> <p>16 MR. STEWART: Certainly not monthly. Again,</p> <p>17 we're protecting our asset.</p> <p>18 MR. CLAWSON: Under "Air Quality," could you</p> <p>19 please address the nature of how this facility will</p> <p>20 affect air quality?</p> <p>21 MR. STEWART: It actually -- what they refer to</p> <p>22 is an ozone issue. And that ozone comes from the</p> <p>23 emissions of volatile organic compounds. We capture all</p> <p>24 of our VOCs and reuse them. So there are no VOCs that</p> <p>25 would be affecting the ozone layer. And what the State</p> <p style="text-align: right;">Page 58</p>	<p>1 in your testimony the dealings with the Department of</p> <p>2 Environmental Quality. Could you just explain to the</p> <p>3 Board in what situations and from what -- how the permits</p> <p>4 required from DEQ are separate from our underground</p> <p>5 injection application?</p> <p>6 MR. STEWART: Absolutely. There are a couple of</p> <p>7 things. One, we have agriculture land on our -- that</p> <p>8 area is zoned for agriculture land. So we have the</p> <p>9 ability, under permit by rule through DEQ, to take</p> <p>10 treated water and apply it to the land for agricultural</p> <p>11 purposes. And it has two criteria: One, TDS below 500,</p> <p>12 and there can be no oil and grease. So we have done</p> <p>13 that. And we are getting an operating permit from them.</p> <p>14 They're going through their own rules right now, so it's</p> <p>15 difficult to get -- because they haven't finished yet.</p> <p>16 We've applied for an NPDES Discharge Permit;</p> <p>17 however, that's a fairly lengthy process. So we</p> <p>18 anticipate that's about six months. We really don't need</p> <p>19 it. Again, it's a backup to something. If we can't sell</p> <p>20 the water one way, we can sell it another. We are doing</p> <p>21 that.</p> <p>22 And then the third was the application for the</p> <p>23 air permit.</p> <p>24 So those are the conversations we've had with</p> <p>25 DEQ.</p> <p style="text-align: right;">Page 60</p>
<p>1 has asked for is that we -- which we have done -- is</p> <p>2 apply for a permit. We have less than 500 pounds a year.</p> <p>3 So they issue a non-permit through DEQ.</p> <p>4 MR. CLAWSON: And then finally on the last page</p> <p>5 in the third full paragraph, they raise a concern that</p> <p>6 the Colorado River be safe from fracking fluid</p> <p>7 contamination.</p> <p>8 Again, will this facility -- will this injection</p> <p>9 well be receiving frac flow back water?</p> <p>10 MR. STEWART: Not into the injection well, no.</p> <p>11 MR. CLAWSON: Because it will be monitored and</p> <p>12 tested before it is injected?</p> <p>13 MR. STEWART: That is correct.</p> <p>14 MR. CLAWSON: That is all the questions I have</p> <p>15 for my witness.</p> <p>16 CHAIRMAN JOHNSON: Ms. Lewis, do you have</p> <p>17 questions?</p> <p>18 MS. LEWIS: I refer to the Division.</p> <p>19 CROSS-EXAMINATION</p> <p>20 BY MR. HILL:</p> <p>21 MR. HILL: Just as a matter of clarification --</p> <p>22 CHAIRMAN JOHNSON: Could you introduce yourself,</p> <p>23 Mr. Hill.</p> <p>24 MR. HILL: Brad Hill for the Division.</p> <p>25 Just a matter of clarification. You mentioned</p> <p style="text-align: right;">Page 59</p>	<p>1 MR. HILL: I just wanted you to clarify that</p> <p>2 these really don't have any bearing on the UIC</p> <p>3 application. They're just for water uses, for treated</p> <p>4 water at that facility.</p> <p>5 MR. STEWART: That's correct.</p> <p>6 MS. LEWIS: No further questions from the</p> <p>7 Division.</p> <p>8 CHAIRMAN JOHNSON: Mr. Shea, do you have</p> <p>9 questions for Dr. Stewart?</p> <p>10 MR. SHEA: I do. Could I suggest the Board take</p> <p>11 a five-minute break just so I can get these in order?</p> <p>12 I'm totally at your command.</p> <p>13 CHAIRMAN JOHNSON: Yeah. About how long do you</p> <p>14 expect your questioning to last?</p> <p>15 MR. SHEA: In part, it depends on the answers I</p> <p>16 get. So I would hope it could be done in a half hour,</p> <p>17 but I can't guarantee that.</p> <p>18 CHAIRMAN JOHNSON: Okay. Why don't we take a</p> <p>19 break for lunch, then, seeing it is almost noon. And</p> <p>20 we'll resume with your questioning after that.</p> <p>21 MR. SHEA: Okay.</p> <p>22 CHAIRMAN JOHNSON: So let's break until -- let's</p> <p>23 try to start at 12:55, okay.</p> <p>24 MR. SHEA: All right. That will be good.</p> <p>25 CHAIRMAN JOHNSON: All right. Thank you.</p> <p style="text-align: right;">Page 61</p>

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<p>1 (A break was taken from 11:52 a.m. to 12:57 p.m.)</p> <p>2 CHAIRMAN JOHNSON: Okay. I believe we're ready</p> <p>3 to resume.</p> <p>4 Mr. Shea, I believe we're at a point where you</p> <p>5 are going to put questions to Dr. Stewart.</p> <p>6 MR. SHEA: Okay. What I'd like to do, if it's</p> <p>7 acceptable to the Board, is divide it into four different</p> <p>8 areas. And if that's -- the areas would be the</p> <p>9 financing, the question of filtration, the question of</p> <p>10 the sequence of the building.</p> <p>11 I know the UIC is the only matter before the</p> <p>12 Board today. But it does seem to me a lot of the</p> <p>13 application is dependent on there being a completion of</p> <p>14 the process, it's not just a question of creating the</p> <p>15 injection well. Your responsibility goes to a larger</p> <p>16 question of whether that's going to do something</p> <p>17 irreparable to the resources of Utah and the United</p> <p>18 States.</p> <p>19 And then the fourth area deals with the</p> <p>20 different ways in which the monitoring will occur. The</p> <p>21 first and the fourth question are related. The</p> <p>22 filtration question is probably -- or excuse me. The</p> <p>23 second and the fourth are related; that is, the</p> <p>24 filtration and the type of testing that would go on.</p> <p>25 So if I may, I'll proceed in that order.</p> <p style="text-align: right;">Page 62</p>	<p>1 question, Mr. Shea. Let's do it that way.</p> <p>2 MR. SHEA: What would be your plans, if for some</p> <p>3 reason the money was not available and you had started</p> <p>4 halfway through the process?</p> <p>5 MR. STEWART: I'm not sure I understand your</p> <p>6 question.</p> <p>7 MR. SHEA: Assume for a moment that you -- say</p> <p>8 the Board goes ahead and gives you approval and then you</p> <p>9 get halfway into creating the injection well and the</p> <p>10 financing disappears. What do you do then?</p> <p>11 MR. STEWART: The financing -- I can't imagine</p> <p>12 that happening because I have both the international</p> <p>13 rights as well as the national rights for this</p> <p>14 technology. And we have more than -- we're in the</p> <p>15 process of negotiating a \$50 million line of credit. So</p> <p>16 financing this little plant is not an issue.</p> <p>17 I have \$7 million available today. The plant</p> <p>18 cost is \$4 1/2 million. The injection well is already</p> <p>19 in. All the equipment for the treatment of the injection</p> <p>20 is available and on site. We can't install it until we</p> <p>21 get approval by the County. But that's there and</p> <p>22 available.</p> <p>23 So there's no question that we'll be able to</p> <p>24 finish the injection well. I've got plenty of money to</p> <p>25 finish the plant as well, so I don't anticipate that</p> <p style="text-align: right;">Page 64</p>
<p>1 CHAIRMAN JOHNSON: Please go ahead.</p> <p>2 MR. SHEA: And I certainly would welcome any</p> <p>3 questions from the Board. I have great respect for Mr.</p> <p>4 Clawson. If he thinks that my questioning is not</p> <p>5 clear --</p> <p>6 CHAIRMAN JOHNSON: I'm certain he will object.</p> <p>7 MR. SHEA: -- I would invite his participation.</p> <p>8 CROSS-EXAMINATION</p> <p>9 BY MR. SHEA:</p> <p>10 MR. SHEA: On the investment side, you testified</p> <p>11 earlier that you had \$7 million. Is that readily</p> <p>12 available? Is that in the form of a bank deposit or?</p> <p>13 MR. STEWART: It's an investment banking</p> <p>14 relationship that we have with our investors in ERPWD.</p> <p>15 MR. SHEA: And ERPWD is?</p> <p>16 MR. STEWART: Is a holding company affiliated</p> <p>17 with Westwater Farms, LLC.</p> <p>18 MR. SHEA: So your testimony is that if the</p> <p>19 Board is to give you approval to proceed on completing</p> <p>20 the UIC, there would be absolutely no financial delays.</p> <p>21 MR. STEWART: Correct.</p> <p>22 MR. SHEA: Could we explore, Mr. Chair, what the</p> <p>23 process would be if there was some kind of financial</p> <p>24 delay?</p> <p>25 CHAIRMAN JOHNSON: Why don't you ask your</p> <p style="text-align: right;">Page 63</p>	<p>1 being an issue. That money already exists.</p> <p>2 MR. SHEA: I'm sure it exists. The question</p> <p>3 that I don't see before the Board is the documentation</p> <p>4 sufficient to say for the citizens of Utah that there's</p> <p>5 no chance that this project wouldn't go forward, but for</p> <p>6 the approval of the application. And it seems to me on a</p> <p>7 fiduciary basis that that needs to be clearer on the</p> <p>8 record than it is today, not just a witness testifying he</p> <p>9 has the money.</p> <p>10 We've had several instances in Utah -- when I</p> <p>11 was director of BLM, we had several mining projects that</p> <p>12 got halfway completed and then, for various reasons, the</p> <p>13 money disappeared.</p> <p>14 MR. JENSEN: May I ask a question, Mr. Chairman?</p> <p>15 CHAIRMAN JOHNSON: Go ahead, Mr. Jensen.</p> <p>16 MR. JENSEN: I can appreciate your question,</p> <p>17 Mr. Shea. But it seems to me that the only issue that's</p> <p>18 before this Board is the injection well itself, not this</p> <p>19 facility, not the funding of the facility. And it seems</p> <p>20 to me that what this Board needs to be satisfied with is</p> <p>21 that whatever product is going into the injection well,</p> <p>22 that we've put sufficient criteria in place that this is</p> <p>23 the only type of water that's going -- these parameters</p> <p>24 are the only parameters that have to be met relative to</p> <p>25 injection.</p> <p style="text-align: right;">Page 65</p>

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<p>1 While Mr. Gill's question about the facility, I 2 think it helped to educate us, it seems to me that this 3 Board needs to stay confined to what the real issue is 4 before us. And it seems to me the issue before us is the 5 injection well itself and the product that this Board 6 would authorize and approve to be injected, what those 7 conditions are. It seems to me that's what we ought to 8 confine our hearing to. Now, I'm only one voice here, 9 but it seems to me that that's what the issue ought to be 10 and what you ought to be asking questions to either 11 ferret out or get satisfied.</p> <p>12 MR. SHEA: The only thing I would raise -- if I 13 might indulge for one moment -- I've always been taught 14 "Follow the money." And in the instance of injecting the 15 water, you are going to have to finance that. And the 16 quality certainly is where the main focus of this hearing 17 today is going to be.</p> <p>18 But it does seem to me to be an important, 19 answerable question of how is that process -- not the 20 building of the buildings -- but that process going to be 21 funded. And the impression I have is that it's going to 22 be funded from the revenue that's generated by oil 23 producers or gas producers paying --</p> <p>24 MR. JENSEN: I think he said that there's 25 \$7 million of equity that they're prepared to put in,</p> <p style="text-align: right;">Page 66</p>	<p>1 citizen and say, "I have \$4 1/2 million," you accept that 2 as sufficient to grant me an application?</p> <p>3 MR. JENSEN: We know that's true from you, Pat.</p> <p>4 MR. CLAWSON: Mr. Chairman, the question has 5 been asked and answered. The answer is, is that the UIC, 6 the well, has already been drilled. It's already paid 7 for.</p> <p>8 CHAIRMAN JOHNSON: I think that's a sufficient 9 answer.</p> <p>10 MR. SHEA: Okay. I respectfully disagree. 11 Let's move on to a different topic.</p> <p>12 Dr. Stewart indicated that he would use a 13 process to filter out any organic material -- were his 14 words -- that might create a souring of the helium. 15 What size of filter do you intend to use?</p> <p>16 MR. STEWART: It's an organic filter. So we use 17 a walnut shell filter and activated carbon. It's not 18 sized based, it's chemically based. So these are 19 removing the nonpolar organic chemicals through an 20 absorption process.</p> <p>21 MR. SHEA: The BLM is not concerned about the 22 chemistry. It's worried about the organic life that 23 could cause the souring.</p> <p>24 MR. STEWART: You can't have organic life until 25 you have organics for them to eat. If you remove the</p> <p style="text-align: right;">Page 68</p>
<p>1 that they've got a \$4 1/2 million cost, and just all from 2 the equity side. And that's the whole facility again.</p> <p>3 MR. SHEA: Right. But I guess my question is: 4 How do we know that that money exists?</p> <p>5 CHAIRMAN JOHNSON: Mr. Shea, the question before 6 the Board today has to with the UIC well. The plant is 7 something auxiliary to it. We're considering the well. 8 And I understand your concern about the total project, 9 but I think as far as it relates to the question before 10 us today, I think you've asked your question, it's been 11 answered. I think we need to move on.</p> <p>12 MR. SHEA: The only question I'm raising, just 13 so we have a clear record on this, is: How are they 14 going to finance the UIC? As far as I can tell, the 15 record is Dr. Stewart's representation he has the money. 16 And I don't know Dr. Stewart. So I'd like to know where 17 that money is. It seems to me that's a legitimate 18 question.</p> <p>19 CHAIRMAN JOHNSON: I'm not sure that that's a 20 concern of the Board's.</p> <p>21 MR. SHEA: How it's financed?</p> <p>22 CHAIRMAN JOHNSON: It may be your concern. I 23 don't think it's a concern of the Board regarding the UIC 24 approval.</p> <p>25 MR. SHEA: So if I come in here as an individual</p> <p style="text-align: right;">Page 67</p>	<p>1 organic material from the petroleum products, then 2 there's nothing for them to eat, and they will not exist.</p> <p>3 The other issue there is that we then inject a 4 biocide to verify that those organic -- that those 5 microorganisms are not there.</p> <p>6 MR. SHEA: I'm a research professor of biology. 7 When I do a filtration experiment, I can tell you down to 8 .1 microns whether or not there's organic life present.</p> <p>9 MR. STEWART: Correct.</p> <p>10 MR. SHEA: That's different than the chemical 11 process that you are testifying on, correct?</p> <p>12 MR. STEWART: No, we have both. We have a -- we 13 start out --</p> <p>14 MR. SHEA: So the question was: What's the size 15 of the filter you use if you have both?</p> <p>16 MR. STEWART: We use a screen size, a 20 mesh 17 screen, goes down to 20 microns, goes down to five 18 microns, goes down to one micron.</p> <p>19 We also are using a walnut shell filter, which 20 has an effective pore size of one micron. Activated 21 carbon has an effective pore size of half a micron.</p> <p>22 MR. SHEA: So you'll be getting any bacteria, 23 but you won't be getting any viruses or fungi, correct?</p> <p>24 MR. STEWART: I would not anticipate. This is 25 not a pathological type material. We don't have,</p> <p style="text-align: right;">Page 69</p>

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<p>1 typically, fungi or viruses -- certainly not viruses.</p> <p>2 Viruses wouldn't come up with produced water. Fungi</p> <p>3 could exist, but we've never experienced it and never</p> <p>4 seen it.</p> <p>5 MR. SHEA: Okay. Let me ask you: There's been</p> <p>6 more or less three terms used. There's "formation</p> <p>7 water," there's "produced water," and "waste water."</p> <p>8 Can you describe for the Board what the</p> <p>9 distinction in your vocabulary is between those three</p> <p>10 types of water?</p> <p>11 MR. STEWART: "Formation water," as I explained</p> <p>12 it this morning, was the receiving water. So that's in</p> <p>13 the Wingate Formation. The "produced water" is what</p> <p>14 we're receiving at the gate. So the produced water comes</p> <p>15 in from the various energy companies as they develop</p> <p>16 their energy source. I'm sorry, the "waste water," we</p> <p>17 have no waste water.</p> <p>18 MR. SHEA: Now, the receiving water is only what</p> <p>19 you would find at the UIC? I'm just trying to clarify in</p> <p>20 my own mind.</p> <p>21 MR. STEWART: Say that again?</p> <p>22 MR. SHEA: The receiving water is the water that</p> <p>23 you found when the well was drilled?</p> <p>24 MR. STEWART: No, that's the formation water.</p> <p>25 That's how Halliburton is identifying it. They're</p> <p style="text-align: right;">Page 70</p>	<p>1 a biological analysis of what organic material exists in</p> <p>2 that water?</p> <p>3 MR. STEWART: Well, we would do that chemically,</p> <p>4 not biologically. We do not look for microorganisms in</p> <p>5 that water. What we look for is a chemistry. So we look</p> <p>6 for total petroleum hydrocarbons, we do GCMS scans, we do</p> <p>7 volatile organic compound scans. That's how we determine</p> <p>8 what organics are there.</p> <p>9 MR. SHEA: Back to the BLM's letter of</p> <p>10 September 15, their express concern on the helium</p> <p>11 reserve.</p> <p>12 MR. STEWART: Correct.</p> <p>13 MR. SHEA: And actually, let me just deviate</p> <p>14 here for a second.</p> <p>15 Do you know why Harley Dome is called Harley</p> <p>16 Dome?</p> <p>17 MR. STEWART: No.</p> <p>18 MR. SHEA: Do you know when it was discovered?</p> <p>19 MR. STEWART: No.</p> <p>20 MR. SHEA: It was created -- sort of for the</p> <p>21 Board's knowledge -- in 1920 because the United States</p> <p>22 declared helium a strategic reserve. So it's one of the</p> <p>23 helium strategic reserves that were preserved over time.</p> <p>24 And there are a number of helium companies, one of which</p> <p>25 I represent, IACX, who are looking to develop the helium</p> <p style="text-align: right;">Page 72</p>
<p>1 identifying it from different formations. So that's the</p> <p>2 water that we're talking about down in the formation.</p> <p>3 MR. SHEA: At the UIC application site?</p> <p>4 MR. STEWART: That's correct.</p> <p>5 MR. SHEA: So when you said "receiving water,"</p> <p>6 that's a fourth category. What does that mean?</p> <p>7 MR. STEWART: I'm talking about two waters. I</p> <p>8 don't know where these other terms are coming from.</p> <p>9 I'm talking about "formation water," which is</p> <p>10 going to be a receipt -- was going to receive this water,</p> <p>11 but it's the formation water. It's what's in the</p> <p>12 formation. And then I have "produced water" that I treat</p> <p>13 and inject into the formation.</p> <p>14 MR. SHEA: Okay. Well, let's move on.</p> <p>15 You testified earlier that your experience is</p> <p>16 that generally within a range the water type -- which I</p> <p>17 guess is the transformation water, formational water --</p> <p>18 is the same. Is that correct?</p> <p>19 MR. STEWART: No. What I said was that in a</p> <p>20 typical basin, you are going to have produced water</p> <p>21 that's generated by the energy producers. And that</p> <p>22 produced water is generally, from that basin, of similar</p> <p>23 quality.</p> <p>24 MR. SHEA: And when you say "similar quality,"</p> <p>25 is that simply a chemical analysis, or does that include</p> <p style="text-align: right;">Page 71</p>	<p>1 that's found in Harley's Dome. They've developed a new</p> <p>2 process.</p> <p>3 I raise that only because in the context of the</p> <p>4 UIC application, I think the Board -- it's important to</p> <p>5 make sure that there is no potential for another resource</p> <p>6 that would benefit the citizens of Utah being adversely</p> <p>7 affected by it. And that's why the United States still</p> <p>8 considers it an important helium reserve.</p> <p>9 But back to the question of the water that will</p> <p>10 be transported here.</p> <p>11 You do a chemical analysis, not an organic</p> <p>12 analysis. Is that correct?</p> <p>13 MR. STEWART: I do a chemistry analysis, which</p> <p>14 includes an organic. You are going to do an organic</p> <p>15 portion of that water, and you're going to do an</p> <p>16 inorganic portion of that water.</p> <p>17 MR. SHEA: Describe the difference between the</p> <p>18 inorganic analysis and the organic analysis.</p> <p>19 MR. STEWART: The organic analysis, again, is</p> <p>20 gas chromatograph, mass spectrometer. We do GPS scans</p> <p>21 for both the volatile and non-volatile portions of that</p> <p>22 water. We also look at simple things, like total organic</p> <p>23 carbon, chemical oxygen demand, those kinds of things</p> <p>24 that give us an idea of what that water is -- what its</p> <p>25 characteristics are like.</p> <p style="text-align: right;">Page 73</p>

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<p>1 When we go over to the inorganics side, we're</p> <p>2 looking for salts, heavy metals, those issues.</p> <p>3 MR. SHEA: Right. You've testified on that.</p> <p>4 But your testimony is, on the organic side, is</p> <p>5 that it goes down to .1 micron. Is that correct?</p> <p>6 MR. STEWART: No. What I said was that we</p> <p>7 remove the organics through an absorption process. These</p> <p>8 filters have an effective pore size that has no bearing</p> <p>9 on removing organics. That organic is a process of</p> <p>10 absorption, not a physical removal.</p> <p>11 MR. SHEA: Let me ask the question this way:</p> <p>12 What's the margin of error on the water that would be</p> <p>13 injected? Are you saying it's zero?</p> <p>14 MR. STEWART: I'm saying that we have certain</p> <p>15 characteristics. We're not going to want any organics to</p> <p>16 go down there, so --</p> <p>17 MR. SHEA: I know you don't want that. But I'm</p> <p>18 just asking: What's the margin of error?</p> <p>19 MR. STEWART: I've run a plant in Wellington,</p> <p>20 Colorado. I've never had an exceedance of BTX. The BTX</p> <p>21 standard is five parts per billion. So we're going to be</p> <p>22 meeting that kind of water quality.</p> <p>23 MR. SHEA: And how often in your Wellington</p> <p>24 plant do you do testing on the water?</p> <p>25 MR. STEWART: Once a week.</p> <p style="text-align: right;">Page 74</p>	<p>1 go. But typically, you do a visual inspection. You're</p> <p>2 going to be looking for surfactants; you are going to be</p> <p>3 looking for different colors, those characteristics. If</p> <p>4 you get a suspicious load, then you'd have that diverted</p> <p>5 off to figure out how that treatment process is going to</p> <p>6 work.</p> <p>7 MR. SHEA: But isn't the process of the testing</p> <p>8 that the operator would put in some container, pull it</p> <p>9 out and look at it, even though the container itself may</p> <p>10 contain -- I don't know how many gallons each of the</p> <p>11 trucks would have.</p> <p>12 MR. STEWART: It has about 4000 gallons. And</p> <p>13 absolutely. But that truck's been moving around. That</p> <p>14 water is very well mixed at that point.</p> <p>15 MR. SHEA: Okay. But it being well-mixed still</p> <p>16 could mean, scientifically, that there are materials that</p> <p>17 the observation and the testing you are proposing to do</p> <p>18 would miss.</p> <p>19 MR. STEWART: So that is why you have the</p> <p>20 multiple barriers to the injection well.</p> <p>21 MR. SHEA: And with those multiple barriers, at</p> <p>22 each barrier what's the margin of error that goes</p> <p>23 through? Independent of your experience at Wellington,</p> <p>24 when you purchase that equipment, what does the equipment</p> <p>25 specification say as to error rate?</p> <p style="text-align: right;">Page 76</p>
<p>1 MR. SHEA: So it's not on every load that comes</p> <p>2 in. It's a once-a-week quality control?</p> <p>3 MR. STEWART: Because it's not a facility that</p> <p>4 receives load. It is a dedicated facility to a field.</p> <p>5 So I know exactly what's coming in and what's going out.</p> <p>6 MR. SHEA: On a once-a-week test?</p> <p>7 MR. STEWART: Yes.</p> <p>8 MR. SHEA: Just so we understand, the Cisco UIC,</p> <p>9 that, with every truck coming in, would be tested.</p> <p>10 MR. STEWART: Yes.</p> <p>11 MR. PAYNE: I'm sorry. The Cisco UIC? Is that</p> <p>12 the same as the Wellington that you were referring to?</p> <p>13 MR. SHEA: No. No. The Wellington is the one</p> <p>14 he's presently operating.</p> <p>15 MR. PAYNE: So what's Cisco? I'm sorry, "Cisco"</p> <p>16 is a new term.</p> <p>17 MR. SHEA: Utah. I was just using the</p> <p>18 geographic location. I like names rather than numbers.</p> <p>19 So your testimony is that every truck load</p> <p>20 coming in would be individually tested?</p> <p>21 MR. STEWART: For certain characteristics,</p> <p>22 correct.</p> <p>23 MR. SHEA: And can you outline again what those</p> <p>24 characteristics are?</p> <p>25 MR. STEWART: I mean, we'll develop this as we</p> <p style="text-align: right;">Page 75</p>	<p>1 MR. STEWART: It doesn't have an error rate.</p> <p>2 What happens is that you've got multiple barriers. So,</p> <p>3 for example, the activated carbon. You are going to have</p> <p>4 multiple canisters. What you are going to do is test in</p> <p>5 between each canister. So you always have two backups to</p> <p>6 the one canister. So that when it gets to the end of</p> <p>7 that, there are no organics that are left that go down</p> <p>8 the well. And what you monitor is in between the two</p> <p>9 canisters. When that one canister is exhausted, it's</p> <p>10 called a lead-lag-lag. The first lag column becomes the</p> <p>11 lead column. And then you put in a brand new one at the</p> <p>12 end of it so that you don't have issues -- or organics</p> <p>13 going down the well.</p> <p>14 MR. SHEA: And your testimony is that it's</p> <p>15 100 percent accurate on every gallon of water that is</p> <p>16 injected into the well?</p> <p>17 MR. STEWART: What's your detection limit that</p> <p>18 you want me to go to?</p> <p>19 MR. SHEA: Well, you are asking me a question.</p> <p>20 What I'm asking you is: What's the limit that</p> <p>21 you are planning --</p> <p>22 CHAIRMAN JOHNSON: Mr. Shea, it seems to me</p> <p>23 we're getting nowhere. I think you need to focus your</p> <p>24 questions on what your issues are. It seems to me you</p> <p>25 are just fishing around.</p> <p style="text-align: right;">Page 77</p>

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<p>1 MR. SHEA: I'm trying to get a scientific answer 2 to a scientific question and he's not giving it. 3 CHAIRMAN JOHNSON: And I think he has given 4 those to you. 5 MR. SHEA: He has? 6 CHAIRMAN JOHNSON: Yes, I believe he has. 7 MR. SHEA: What's the margin of error, then? 8 CHAIRMAN JOHNSON: I think he testified what the 9 process is. And then from that, we can decide whether we 10 think that's adequate for the UIC -- 11 MR. SHEA: And you are familiar with the process 12 he's talking about? 13 CHAIRMAN JOHNSON: Mr. Shea, I think we need to 14 move forward. 15 MR. SHEA: I think the citizens of Utah ought to 16 be able to know the quality of the water that's going in 17 the well. 18 CHAIRMAN JOHNSON: I'm telling you: I don't 19 think we're getting anywhere very fast at all. 20 MR. SHEA: Well, that's because the witness 21 isn't answering the question. 22 CHAIRMAN JOHNSON: Mr. Shea, I believe he is. 23 Please, let's try to move forward. 24 MR. SHEA: All right. Let's examine the 25 testimony about the seeps into the Colorado.</p> <p style="text-align: right;">Page 78</p>	<p>1 I'm just trying to find out -- 2 CHAIRMAN JOHNSON: I'm sorry, Mr. Shea. I 3 apologize for that. But I'm getting a little frustrated 4 at -- 5 MR. SHEA: We've sat here for an hour-and-a-half 6 as they put on their testimony. I've had two days to 7 look at the record. And I'm simply trying to explore the 8 factual evidence this Board is going to depend on. 9 Two rangers testifying about whether there are 10 seeps or no seeps on the Colorado River is ridiculous. 11 And I testify on that as a former director of the BLM, 12 where they don't have enough time to do the things they 13 need to do. And it should not be a basis for the Board 14 to make a decision about the potential for seeps from 15 this injection well going into a national river. 16 CHAIRMAN JOHNSON: And we are concerned about 17 getting information for the UIC. And I would like to get 18 that information out. 19 I'm just saying I don't think that the questions 20 that you are asking along that line over and over again 21 are getting us anywhere. And I would appreciate if we 22 could get all the information on it. 23 MR. SHEA: And the potential for a seep from the 24 well you are approving is not a legitimate area of 25 inquiry for the application?</p> <p style="text-align: right;">Page 80</p>
<p>1 You testified that you talked to two rangers 2 from the BLM. Is that correct? 3 MR. STEWART: Yes. 4 MR. SHEA: And do you know how many -- 5 MR. STEWART: Let me correct that. Not me, 6 personally. My hydrogeologist, Paul Stone, talked to two 7 rangers. 8 MR. SHEA: Do we have the names of those two 9 rangers? 10 MR. STEWART: He does. 11 MR. SHEA: But you don't? 12 MR. STEWART: I don't have it with me. I can 13 get those. 14 MR. SHEA: What's the square mile area that they 15 have to cover as rangers -- or do you know how many 16 rangers there are for BLM in the Moab district? 17 MR. STEWART: No. 18 MR. SHEA: There are two. There's over 19 2 million square acres. And you are expecting -- 20 CHAIRMAN JOHNSON: Mr. Shea, "square acres," is 21 that a technical term? 22 MR. SHEA: It's redundant. Excuse me. 23 CHAIRMAN JOHNSON: Oh, okay. Thank you. 24 MR. SHEA: In trigonometry, you can have other 25 than a square acre. But we'll accept that it's square.</p> <p style="text-align: right;">Page 79</p>	<p>1 CHAIRMAN JOHNSON: No, I didn't say that. 2 Please, let's move forward. Go ahead. 3 MR. SHEA: Let's explore how the determination 4 was made by this witness as an expert that there are no 5 seeps coming from this area into the Colorado. And other 6 than two overworked BLM rangers, I don't see any other 7 evidence. 8 MR. STEWART: Can I answer that? 9 CHAIRMAN JOHNSON: Go ahead, Dr. Stewart. 10 MR. STEWART: Paul Stone walked the canyon 11 himself as a baseline. He walked the entire portion that 12 was negotiated with Fish and Wildlife as to what they 13 were concerned about. And so he visually walked it. We 14 have pictures of that. We have pictures of the whole 15 thing. 16 And then he interviewed the two rangers and 17 asked them if they were aware of any seeps. And they 18 said no. So I assume that they, too, have been in that 19 canyon and would know about that. But I don't have any 20 idea. So we physically walked the canyon. There are no 21 seeps in the Wingate. 22 MR. SHEA: Who is Paul Stone? 23 MR. STEWART: He is my hydrogeologist. He's a 24 professional geologist, and he's my hydrogeologist 25 internally. He works for me.</p> <p style="text-align: right;">Page 81</p>

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<p>1 MR. SHEA: When you say you walked the Westwater 2 Canyon, would you agree there are parts you can't walk 3 because of the flow? 4 MR. STEWART: Yes. But he could observe those 5 areas that he couldn't walk. And again, he's looking at 6 the Wingate Formation and he's not findings any seeps. 7 MR. SHEA: Okay. In the first part of our 8 letter that the Board received this morning, it talks 9 about the water pressure rising as the injection occurs 10 outside the particular formation that Mr. Stone examined. 11 Do you agree that that's a legitimate concern? 12 MR. STEWART: Are you asking me or the Board? 13 MR. SHEA: I'm asking you. You are the witness. 14 MR. CLAWSON: Mr. Chairman, this witness didn't 15 testify about the water pressure raised in Living Rivers' 16 letter. Mr. Allin, to my left, will be testifying to 17 that. Maybe he'd like to hold the question for him. 18 MR. SHEA: I'll hold it until Mr. Allin 19 testifies. But I would like to reserve the right to come 20 back with this witness if we don't get a complete answer 21 out of Mr. Allin. 22 CHAIRMAN JOHNSON: Please move forward. 23 MR. SHEA: All right. For the Board, do you 24 consider the water that is being injected into this well 25 you are applying for to be tributary water or</p> <p style="text-align: right;">Page 82</p>	<p>1 MR. SHEA: And are you familiar with the state 2 engineer of Utah's effort to categorize and classify the 3 groundwater in the state of Utah? 4 MR. STEWART: Yes. 5 MR. SHEA: And has he examined this area of the 6 Uinta Basin for that purpose? 7 MR. STEWART: Not to my knowledge. 8 MR. SHEA: So we could not answer definitively 9 whether this is, using the Colorado term, "tributary" or 10 "nontributary"? 11 MR. STEWART: It most likely is nontributary, 12 because the oil wouldn't be there if it were tributary. 13 MR. HAROUNY: Mr. Shea, are we talking about the 14 Uinta Basin now or Paradox Basin? 15 MR. SHEA: I'm talking about both. And if the 16 Board would like, we can ask the same question for both 17 areas. 18 Can you answer the question for the two basins? 19 MR. STEWART: I have not looked at the specific 20 geology in Utah as it relates to produced water. 21 MR. SHEA: And Mr. Chair, the only reason I 22 raise this is the Governor yesterday in Las Vegas before 23 the National Governor's Association was engaged in a 24 fairly active debate about the Colorado River Compact, 25 the upper state -- upper basin states and the lower basin</p> <p style="text-align: right;">Page 84</p>
<p>1 nontributary water? 2 MR. STEWART: Nontributary. 3 MR. SHEA: And the basis of that judgment is? 4 MR. STEWART: In Colorado, where a lot of this 5 water comes from, that basin, under House Bill 1303 and 6 Senate Bill 165, has been classified as "nontributary." 7 MR. SHEA: When you say "House" and "Senate," is 8 that the House and Senate of Colorado? 9 MR. STEWART: Yes. 10 MR. SHEA: But not of Utah? 11 MR. STEWART: Yes. 12 MR. SHEA: And some of this water would be 13 coming from Utah? 14 MR. STEWART: Correct. They do not have a term 15 "tributary" or "nontributary" in Utah. 16 MR. SHEA: Excuse me. Are you familiar with the 17 1923 Colorado Compact? 18 MR. STEWART: Very familiar. 19 MR. SHEA: And that is not used as -- 20 "tributary" or "nontributary" -- as a distinction? 21 MR. STEWART: No. They use "surface flows" and 22 "tributary flows," but they do not classify. Colorado is 23 the only state that classifies their water and gives it a 24 statistical valuation as to "nontributary." They have 25 "tributary," "nontributary," and "not nontributary."</p> <p style="text-align: right;">Page 83</p>	<p>1 states. And I think questions about whether it's 2 tributary or nontributary are going to become very 3 important policy questions that, admittedly, are not 4 before the Board but will be impacted by the decisions 5 the Board makes. And I think there are unknowns there 6 that would warrant, at least, further inquiry of the 7 state engineer as to his studies or lack thereof for the 8 two basins that are being discussed here. 9 And if we don't do it, I would conjecture with a 10 reasonable degree of certainty that other states will be 11 doing it because of the impact it may have or may not 12 have on the Colorado River. 13 MR. JENSEN: I guess, Mr. Shea, I don't 14 understand why that has any application to the 15 application that's before us. Where the water comes 16 from, that's not before us. 17 MR. SHEA: Let me try, if I might, and I 18 appreciate it's taking the Board's time. 19 As I understand from practicing water law, there 20 are allocations under the 1923 Colorado River Compact 21 from each of the Colorado states, so to speak, upper 22 basin and lower basin. The estimate in 1923 was 23 significantly off the mark. And so we are now in a time 24 of rapid population growth where, particularly, the lower 25 basin states are having -- are making demands on</p> <p style="text-align: right;">Page 85</p>

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<p>1 additional flow. And that flow will come from areas that</p> <p>2 are considered to be, quote, tributary, meaning that they</p> <p>3 would normally flow into and support the Colorado River</p> <p>4 system.</p> <p>5 If they are noncontributory (sic) then that's</p> <p>6 not a question. But it's a question that is going to be</p> <p>7 paramount in importance as we renegotiate the upper basin</p> <p>8 section.</p> <p>9 MR. JENSEN: I think you've made your -- you</p> <p>10 made your point. Appreciate that. But that's going</p> <p>11 to -- when and if that comes, that's going to be in front</p> <p>12 of a different body than this body relative to injection</p> <p>13 well.</p> <p>14 MR. SHEA: Correct. Although this body is</p> <p>15 making a decision on how that water -- where that water,</p> <p>16 so to speak, is going to be stored. And if, in fact,</p> <p>17 it's going to be recycled, then there's going to be a</p> <p>18 question of ownership.</p> <p>19 MR. JENSEN: That's not for this Board.</p> <p>20 MR. SHEA: But if you are approving the storage</p> <p>21 of the water, who is going to determine the ownership?</p> <p>22 MR. JENSEN: That is not before this Board. We</p> <p>23 don't have the ability to make that determination. So</p> <p>24 let's move on.</p> <p>25 MR. JOHNSON: Mr. Chairman, if I might just</p> <p style="text-align: right;">Page 86</p>	<p>1 The first inquiry that's left is -- I have to</p> <p>2 say I'm a belt-and-suspenders person when it comes to</p> <p>3 natural resources.</p> <p>4 And I'd like to have the witness -- if there's</p> <p>5 \$7 million available, what's the problem, for matters of</p> <p>6 monitoring the UIC well, of creating three monitoring</p> <p>7 wells downslope, just to be an early warning system of</p> <p>8 any seepage?</p> <p>9 MR. STEWART: How far away are these? Are they</p> <p>10 on BLM land? Are they on private land? How deep are</p> <p>11 they?</p> <p>12 MR. SHEA: From your map, there is no private</p> <p>13 land they could be on, so they'd be on BLM land.</p> <p>14 MR. STEWART: If we're doing it at the outcrop,</p> <p>15 a quarter mile back from the outcrop, and it's a 100-foot</p> <p>16 well, there is no problem with that.</p> <p>17 MR. SHEA: Well, it would have to be deeper than</p> <p>18 a 100-foot well because you are down at 1700 feet.</p> <p>19 MR. STEWART: At the well we are, at the</p> <p>20 injection well, but it slopes upward. So it eventually</p> <p>21 hits the canyon wall, and you are not as deep there, so.</p> <p>22 MR. SHEA: You'll agree -- and again, Mr.</p> <p>23 Clawson has told me that Mr. Allin will be talking about</p> <p>24 the geology. But it's a disconformed (sic) area to the</p> <p>25 east of the well. Is that correct?</p> <p style="text-align: right;">Page 88</p>
<p>1 interject something, maybe for the benefit of the Board</p> <p>2 as this whole matter proceeds. As we've gone through a</p> <p>3 number of issues that this witness has been questioned</p> <p>4 about, there's been some debate about whether it's really</p> <p>5 in front of the Board or not. And maybe if each of the</p> <p>6 parties, especially when those discussions arise, will do</p> <p>7 their best to tie it to the UIC rules or the statutes</p> <p>8 which govern this proceeding just to aid the Board in</p> <p>9 understanding where that line of questioning and the</p> <p>10 testimony you are eliciting fits within the analysis or</p> <p>11 doesn't fit within the analysis.</p> <p>12 MR. SHEA: Can you include the EPA regulations</p> <p>13 on that?</p> <p>14 MR. JOHNSON: I'm not trying to tell anybody</p> <p>15 what their argument should be as to whether it's germane</p> <p>16 or not. I'm just asking that those arguments be made for</p> <p>17 the Board's benefit. So there may be disagreement among</p> <p>18 the parties what's material or not. But if an effort can</p> <p>19 be made to articulate how it is that each of the parties</p> <p>20 feels that the question fits within what is in front of</p> <p>21 the Board, I think that would aid the Board in its</p> <p>22 determination.</p> <p>23 MR. SHEA: I appreciate that. And we'll</p> <p>24 certainly try to do that. I really have just three more</p> <p>25 inquiries.</p> <p style="text-align: right;">Page 87</p>	<p>1 MR. STEWART: That's a question for Mr. Allin.</p> <p>2 MR. SHEA: Okay. I'll wait on that question,</p> <p>3 then.</p> <p>4 And again, I may have missed this, but when will</p> <p>5 the filtration process be operational?</p> <p>6 MR. STEWART: "Which filtration?"</p> <p>7 MR. GILL: What was the answer to that? I</p> <p>8 didn't hear it.</p> <p>9 MR. STEWART: Which filtration.</p> <p>10 MR. SHEA: Why don't you describe for me the</p> <p>11 different filtration process and then give a date at</p> <p>12 which they'll be operational.</p> <p>13 MR. STEWART: Since we are asked to tie this to</p> <p>14 the injection well, that filtration is available today.</p> <p>15 I have it. It's available. I can't install it until I</p> <p>16 get the Conditional Use Permit from the County. But it's</p> <p>17 available today.</p> <p>18 MR. SHEA: I wasn't questioning its</p> <p>19 availability, I was questioning its operation.</p> <p>20 Assume for a moment --</p> <p>21 MR. CLAWSON: Mr. Chairman, he's asked this</p> <p>22 question. It's been answered. He can't install it</p> <p>23 because he's waiting for the CUP permit.</p> <p>24 MR. SHEA: Excuse me. With cross-examination, I</p> <p>25 get to have some latitude.</p> <p style="text-align: right;">Page 89</p>

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<p>1 And assume for a moment that January 1 is the</p> <p>2 day that Grand County gives their permit. My question</p> <p>3 is: When would the filtration processes be operational?</p> <p>4 CHAIRMAN JOHNSON: Okay. Let's answer when the</p> <p>5 filtration process would be available. I think he's</p> <p>6 already answered, or described the filtration itself.</p> <p>7 So when will it be available?</p> <p>8 MR. STEWART: They are available today. It</p> <p>9 would be operational, probably, within ten days of</p> <p>10 obtaining the operational permit from the UDOGM, as well</p> <p>11 as the operational permit from the County.</p> <p>12 MR. SHEA: Thank you. That's all I needed to</p> <p>13 know.</p> <p>14 Second question: With the frac fluids, which</p> <p>15 you've indicated you would not inject into the well, you</p> <p>16 said that you would store them in a side tank that was</p> <p>17 capable of holding one hauling truck.</p> <p>18 And where would they go after they had been</p> <p>19 analyzed and confirmed as frac fluids?</p> <p>20 MR. STEWART: Well, most likely -- we can treat</p> <p>21 frac fluids. Fracking is purely organic. We can treat</p> <p>22 them. Typically, you have to oxidize them before you do</p> <p>23 that. So you would oxidize it with a bleach. And then</p> <p>24 you'd send it through the same process.</p> <p>25 MR. SHEA: And then it would be injected?</p> <p style="text-align: right;">Page 90</p>	<p>1 tracer tests?</p> <p>2 MR. STEWART: That would be a question for</p> <p>3 Mr. Allin.</p> <p>4 MR. SHEA: Okay. Thank you.</p> <p>5 CHAIRMAN JOHNSON: Is that all, Mr. Shea?</p> <p>6 MR. SHEA: Just one second. If I may, one last</p> <p>7 question.</p> <p>8 If there is a delay in the Grand County Zoning</p> <p>9 Commission giving you approval, will you begin injecting</p> <p>10 water into the UIC before you get approval from Grand</p> <p>11 County?</p> <p>12 MR. STEWART: No. We have to have an operating</p> <p>13 permit from Grand County as well.</p> <p>14 MR. SHEA: Okay. Thank you. That's all.</p> <p>15 CHAIRMAN JOHNSON: Does the Board have any</p> <p>16 questions for Dr. Stewart?</p> <p>17 Go ahead, Mr. Harouny.</p> <p>18 CROSS-EXAMINATION</p> <p>19 BY MR. HAROUNY:</p> <p>20 MR. HAROUNY: Dr. Stewart, you have done some</p> <p>21 hydrology work, or you have a hydrologist on your staff,</p> <p>22 I believe?</p> <p>23 MR. STEWART: Yes.</p> <p>24 MR. HAROUNY: Have you looked at hydrodynamics</p> <p>25 uphole, shallower, in certain zones that may contain</p> <p style="text-align: right;">Page 92</p>
<p>1 MR. STEWART: The organics would be removed. So</p> <p>2 only thing that's being injected, again, are the salts.</p> <p>3 MR. SHEA: I was unclear when you said earlier</p> <p>4 that there'd be no frac fluids put in. You are saying</p> <p>5 frac fluids treated would be injected?</p> <p>6 MR. STEWART: If they can be treated; otherwise,</p> <p>7 they'll go to another disposal facility.</p> <p>8 MR. SHEA: Yeah. But you did say that they</p> <p>9 could be treated?</p> <p>10 MR. STEWART: Yes, I believe they can. It is</p> <p>11 not going to be our practice to take frac fluids.</p> <p>12 Sometimes they get involved with the produced water, so</p> <p>13 you've got to have a plan for that. We do have a plan</p> <p>14 for that. It's to remove the organics. If I remove the</p> <p>15 organics, the characteristic of the frac fluid is then</p> <p>16 just a high TDS water.</p> <p>17 MR. SHEA: And if you can't, where would they</p> <p>18 then go?</p> <p>19 MR. STEWART: We have contracts with other</p> <p>20 disposal facilities that don't inject the water. So</p> <p>21 Danish Flats is an example. They have an evaporation pit</p> <p>22 there.</p> <p>23 MR. SHEA: Okay. And final question -- and this</p> <p>24 may go to Mr. Allin. But is there any way, on a daily</p> <p>25 basis, you could do groundwater flow tests or cross-hole</p> <p style="text-align: right;">Page 91</p>	<p>1 fresh water? Any kind of aquifer studies done in that</p> <p>2 area in proximity to the anticipated zone where you're</p> <p>3 going to be injecting?</p> <p>4 MR. STEWART: Really, that's a question for Dave</p> <p>5 Allin. But we have had Dave look at that, then the</p> <p>6 County hired Dr. Downs to also do that. And Dr. Downs</p> <p>7 concurred with Mr. Allin.</p> <p>8 MR. HAROUNY: I'm very familiar with the area,</p> <p>9 and I've, in the past, been involved in the area. And</p> <p>10 I've known of fresh water existence and stratas deeper</p> <p>11 than seven, 800 feet, so.</p> <p>12 MR. STEWART: Yes.</p> <p>13 CHAIRMAN JOHNSON: Any other questions from the</p> <p>14 Board?</p> <p>15 Mr. Clawson, do you have redirect?</p> <p>16 MR. CLAWSON: I do. I have just a couple of</p> <p>17 questions.</p> <p>18 REDIRECT EXAMINATION</p> <p>19 BY MR. CLAWSON:</p> <p>20 MR. CLAWSON: There's a concern about whether or</p> <p>21 not organics can be injected into the hole.</p> <p>22 Will Westwater test for the development of gas</p> <p>23 in the formation at the well site?</p> <p>24 MR. STEWART: Yes.</p> <p>25 MR. CLAWSON: So it would be a constant</p> <p style="text-align: right;">Page 93</p>

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<p>1 monitoring on whether or not gas is being formed in the 2 formation?</p> <p>3 MR. STEWART: Correct.</p> <p>4 MR. CLAWSON: And has the state of Utah state 5 engineer agreed to your process, your plan?</p> <p>6 MR. STEWART: Which plan?</p> <p>7 MR. CLAWSON: Well, the injection of water.</p> <p>8 MR. STEWART: Oh, yes, uh-huh. It's purely -- 9 it's a Class II injection well. So whether it's 10 tributary or not tributary, it's immaterial to a Class II 11 injection well. It's coming from a petroleum operation, 12 goes back into the formation.</p> <p>13 MR. CLAWSON: That's all I have.</p> <p>14 CHAIRMAN JOHNSON: Okay. Would you like to move 15 forward with Mr. Allin then, Mr. Clawson?</p> <p>16 MR. CLAWSON: Sure. I'd like to call my next 17 witness.</p> <p>18 DAVID L. ALLIN, 19 having been first duly sworn, 20 was examined and testified as follows: 21 DIRECT EXAMINATION 22 BY MR. CLAWSON: 23 MR. CLAWSON: Would you please state your full 24 name and address for the record? 25 MR. ALLIN: David L. Allin. My address is</p> <p style="text-align: right;">Page 94</p>	<p>1 project for the trust department at Zions that was well 2 outside their purview of expertise. So I was involved in 3 that.</p> <p>4 After that, I was involved in -- and during that 5 time -- involved in a private company called Petro Lease 6 Co, that, with the assets of the estate I was involved in 7 from Petroleum Investment Company and John Ogerson 8 (phonetic), we merged those elements with subsidiaries of 9 Pennzoil, Marathon, and Superior.</p> <p>10 After that, I formed Rocky Mountain Exploration 11 Company. We generated prospects throughout the Rocky 12 Mountain region -- primarily in Utah, though. That 13 company was merged with a Houston-based company in 1980. 14 And since that time, I've worked for more local Utah 15 companies, Amber Oil & Gas being one. They had assets in 16 the Greater Cisco field, where the Harley Dome 1 well is 17 still within that field, that designated field. And I 18 had my own leases, which I just sold last year, which 19 operated in the Greater Cisco field.</p> <p>20 And my levels of experience related to the area 21 have been a 35-year time frame, basically, with this 22 field and the Uintah Basin and Grand County.</p> <p>23 MR. CLAWSON: Do you have hold any licenses and 24 are a member of any professional organizations? 25 MR. ALLIN: Yes. I am licensed by the Utah</p> <p style="text-align: right;">Page 96</p>
<p>1 475 --</p> <p>2 MR. GILL: Would you hold that very close.</p> <p>3 MR. CLAWSON: Please state your full name and 4 address for the record.</p> <p>5 MR. ALLIN: David L. Allin. My address is 475 6 Seasons Drive, Grand Junction, Colorado, 81507.</p> <p>7 MR. CLAWSON: And what's your affiliation with 8 Westwater Farms, LLC?</p> <p>9 MR. ALLIN: I was -- I'm engaged as a consultant 10 to them through a company that is my primary employer. 11 I'm farmed out as a consultant to evaluate their project 12 and file necessary permits on their project.</p> <p>13 MR. CLAWSON: Could you please provide a brief 14 summary of your education and your experience?</p> <p>15 MR. ALLIN: I received a bachelor of science 16 degree in geology from the University of Wyoming in 1976. 17 And since that time -- or actually before that time, I 18 began work here in Salt Lake City for Petroleum 19 Investment Company in 1975 as an exploration manager and 20 evaluator of BLM oil and gas leases. The proprietor of 21 that company died in 1977.</p> <p>22 Then I was engaged to liquidate his estate for 23 the trust department of Zions Bank. And since it 24 involved several hundred thousand acres of both state and 25 federal oil and gas leases, it was a fairly significant</p> <p style="text-align: right;">Page 95</p>	<p>1 Department of -- what is it -- Occupation and 2 Professional License -- or Office of Professional 3 Licensing as a petroleum geologist. I was granted that 4 license in 2003.</p> <p>5 I'm also a member of the American Association of 6 Petroleum Geologists. I'm certified by a subsect of that 7 group called the CPG as a Certified Petroleum Geologist. 8 And I've been certified by that body since 1983 as a 9 petroleum geologist.</p> <p>10 I also belong to the Utah Geological Association 11 and the Utah Association for Professional Landmen.</p> <p>12 MR. CLAWSON: Are you familiar with the 13 hydrogeology of the Wingate Sandstone in southeastern 14 Utah?</p> <p>15 MR. ALLIN: Yes. And the basis for that has 16 been fairly extensive study since 1999, where I was 17 involved in the exploration of, mainly, Middle Jurassic 18 sandstones for oil and gas reserves in the Flat Rock 19 field and Seep Ridge fields of Uintah County. That 20 involved drilling multiple wells to these formations at 21 depths there near 12,000 feet, and evaluating a total of 22 50 square miles of 3D seismic data coverage that I was a 23 principal investigator on.</p> <p>24 MR. CLAWSON: I'd ask that Mr. Allin be 25 recognized as an expert for the present matter for</p> <p style="text-align: right;">Page 97</p>

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<p>1 purposes of geological interpretation, geohydrological 2 engineering, and water injection projects.</p> <p>3 CHAIRMAN JOHNSON: Ms. Lewis, any questions or 4 objections?</p> <p>5 MS. LEWIS: No objections.</p> <p>6 CHAIRMAN JOHNSON: Mr. Shea?</p> <p>7 MR. SHEA: I didn't hear him testify on his 8 experience on the hydrology side.</p> <p>9 Could you clarify what experience he's had on 10 the hydrology involved in the injection wells?</p> <p>11 MR. ALLIN: Yes. I had direct participation in 12 filing UIC permits, both Class II and Class I in the case 13 of a well called Blue Bench over by Duchesne, Utah, a 14 number of years ago.</p> <p>15 I also had applied for another EPA Class II 16 permit for a Frank Arroches (phonetic), a water well 17 company owner in Uintah County at Ft. Duchesne.</p> <p>18 More recently, I just obtained a UIC permit from 19 EPA for the Seep Ridge WIW 1 in the Seep Ridge field in 20 Uintah County from EPA. That was on behalf of a partner 21 of the company I work for called Summit Energy.</p> <p>22 In the meantime, I'm to a final permit stage on 23 another UIC permit with EPA, Region 8, for the -- another 24 well in Uintah County on property that Del Rio Resources 25 operates, and that well would be designated the DNL E</p> <p style="text-align: right;">Page 98</p>	<p>1 hydrology.</p> <p>2 MR. JENSEN: -- as opposed to hydrology. And I 3 think that's what the issue --</p> <p>4 MR. CLAWSON: Okay, now, I understand.</p> <p>5 Can you describe your experience when it comes 6 to -- either in your education or your experience -- when 7 it comes to hydrology?</p> <p>8 MR. ALLIN: Yes. The distinction is really just 9 a matter of the difference between what fluid occupies 10 the core space in an aquifer or an oil and gas reservoir. 11 If the core space is occupied primarily by water, then 12 it's a hydrology project. If it's primarily occupied by 13 oil and gas or hydrocarbons, then it's primarily an oil 14 and gas or petroleum exploitation application of my 15 experience.</p> <p>16 As far as evaluating what needs to be assembled, 17 what needs to be submitted for UIC permits for 18 consideration by the regulators, I have to have an eye 19 for what characterizes the attributes of the formation, 20 its contents, whether or not there's hydrodynamic flow 21 involved, whether or not the formation -- how it behaves 22 under injection stress, how it behaves under production 23 stress, either one.</p> <p>24 From the standpoint of trying to make a 25 distinction, it's really a matter of a focus on just</p> <p style="text-align: right;">Page 100</p>
<p>1 Gusher Disposal 1 (phonetic).</p> <p>2 I also published in Utah Geological Association 3 guidebooks on the -- a very unique field that involves 4 hydrodynamic flow, displaced aquifers in the Upper Valley 5 field in Southern Utah, and published on the Kaiparowits 6 Basin hydrogeology in the Oil & Gas Journal.</p> <p>7 MR. SHEA: I have no objection to him being an 8 expert on the application process. But I would object to 9 him being considered an expert on the operations side of 10 the hydrogeology aspects of the UIC well. He's certainly 11 an expert on how you apply for permits, but he's not an 12 expert on how you operate those permits once they're 13 granted.</p> <p>14 CHAIRMAN JOHNSON: Mr. Clawson.</p> <p>15 MR. CLAWSON: I'm not asking he be admitted as 16 an expert for the operational aspects. I mean, I'm not 17 sure I understand the distinction. For purposes of this 18 proceeding, they just seem mirrored to me.</p> <p>19 CHAIRMAN JOHNSON: Does the Board have any 20 questions or objections?</p> <p>21 MR. JENSEN: It seems to me that Mr. Shea asked 22 the question that he found the questions to be lacking in 23 hydrology. And now the responses that came seem to be in 24 terms of applying for UIC --</p> <p>25 MR. CLAWSON: -- UIC application as opposed to</p> <p style="text-align: right;">Page 99</p>	<p>1 contents of the formation. Because the -- as far as my 2 experience with it, I probably have much more experience 3 just from processing these permits dealing with the 4 questions that come up relating to safe disposal of 5 produced water in Class II wells, or in the case of a 6 Class I well, how that should be handled, whether or not 7 anything's going to migrate out of zone.</p> <p>8 So it really boils down to, although I'm not a 9 degreed engineer, I have extensive experience in 10 evaluating these very specific issues that relate to 11 migration of fluids within reservoirs; and so therefore, 12 you know, as far as my experience versus, probably, one 13 in another 50 consulting petroleum geologists, I probably 14 have more experience than, like I say, one in 50.</p> <p>15 CHAIRMAN JOHNSON: Mr. Shea, does that address 16 your concerns?</p> <p>17 MR. SHEA: Well, again, I'm having a hard time 18 understanding where, as a consultant, his work stops and 19 where the operation begins, and whether or not -- from 20 the Board's perspective -- the basis of his expertise is 21 sufficient to make an expert judgment on the dynamics 22 that the Board is authorizing. He's good, certainly, on 23 paper. He's done a lot of applications. But what 24 happens after that paper is filed and approved by the 25 Board, it seems to me is within the purview of the Board</p> <p style="text-align: right;">Page 101</p>

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<p>1 in approving a UIC application. And I don't see him 2 having expertise on that.</p> <p>3 CHAIRMAN JOHNSON: Go ahead, Mr. Harouny.</p> <p>4 MR. HAROUNY: Mr. Clawson, is there a reason why 5 a hydrologist, a certified hydrologist, wasn't present, 6 or the person that is employed by the organization is not 7 here?</p> <p>8 MR. CLAWSON: We thought we could provide the 9 Board with the testimony that it needed by using 10 Mr. Allin. I mean, I can understand Mr. Shea's concern 11 about the operations after approval. But it seems to me 12 that that is a separate question from the Board's 13 approval of the application itself. I mean, in other 14 words...</p> <p>15 (Mr. Clawson consulted with his experts.)</p> <p>16 MR. CLAWSON: You know, when it comes to the 17 actual approval of the application and whether or not 18 this formation will handle the fluids and be able to 19 handle the pressures and be able to take the volumes of 20 the fluids and such, I think he's qualified to answer 21 those questions. He's prepared this permit. He's -- and 22 other permits and has experience doing that. And he 23 knows the questions to ask and how to resolve them.</p> <p>24 When it comes to the operations of the well 25 itself, I mean, that's more of a staff position for</p> <p style="text-align: right;">Page 102</p>	<p>1 geology side or the hydrology side as to the hypothesis 2 he tested, he's not involved. He can't testify about 3 that.</p> <p>4 And I'm just saying I think the Board needs to 5 have some examination of that by somebody who has had 6 experiences, both with success -- which we hopefully will 7 have -- but also with failure. You know, where did the 8 application go wrong in predicting an anomaly that was a 9 mistake?</p> <p>10 MR. GILL: Let me make sure I understand. The 11 witness testified that there is pore space. And pore 12 space can be completely filled with petroleum products, 13 or it can be completely filled with water, or a 14 combination of both. Typically, it's a combination of 15 both. That is the reason you have produced water, is 16 when they're both present.</p> <p>17 I don't see the clear demarcation between an 18 expert in petroleum geology and the reaction of the 19 formation because substances are removed or injected. 20 That is a very subtle difference in terms of what 21 hydrologists would testify or petroleum geologists would 22 testify. Hydrology geologists or petroleum geologists, I 23 don't see the difference at this point because -- and so 24 trying to limit him from testifying...</p> <p>25 Why don't we let him testify, and then at the</p> <p style="text-align: right;">Page 104</p>
<p>1 Westwater Farms. You know, that has to be operated 2 within the parameters that the Board and Division 3 approve. I'm not sure that that's all that important.</p> <p>4 CHAIRMAN JOHNSON: Okay. Mr. Shea, I believe 5 you said you don't have any objections to Mr. Allin being 6 recognized as an expert in the field of geology.</p> <p>7 MR. SHEA: Certainly.</p> <p>8 CHAIRMAN JOHNSON: Okay. If we get into 9 questions, then, that require opinions on the hydrology, 10 operational hydrology, Mr. Shea, if you've got objections 11 to those questions, please raise them at that time and 12 we'll deal with them then.</p> <p>13 MR. SHEA: If I could, just for point of 14 clarification: I take what Mr. Clawson has said is that 15 he prepares the application. When the application is 16 successful, he's ended. So if anything has gone wrong or 17 his predictions were incorrect, he would not be able to 18 testify on that?</p> <p>19 CHAIRMAN JOHNSON: I'm not sure I understand 20 your question, Mr. Shea.</p> <p>21 MR. SHEA: As I understand what he's testified 22 to is he prepares the application. He tests all the 23 hypotheses necessary under Type II injection wells.</p> <p>24 When that is over and done with, the Board has 25 approved it, if anything has gone wrong on either the</p> <p style="text-align: right;">Page 103</p>	<p>1 end of that, we can put weight and materiality filters on 2 what he testifies to, if they're lacking or if it would 3 take another expertise. But at this point, the crossover 4 of those two skill sets doesn't seem to make a difference 5 to me.</p> <p>6 MR. HAROUNY: Mr. Shea, as you are well aware, 7 in order to become a hydrologist, you have to go through 8 geology first --</p> <p>9 MR. SHEA: Correct.</p> <p>10 MR. HAROUNY: -- basically. And there's very 11 little difference at the end, as far as speciality and 12 how you become a hydrologist. You first and foremost 13 have to become a geologist, and then you choose your 14 specialty as a geologist, a hydrologist. I've seen named 15 recognitions as such -- geologist, hydrologist. It's a 16 specialty, but it does not completely differentiate 17 between two different regimes, if you will.</p> <p>18 MR. SHEA: But I certainly --</p> <p>19 MR. GILL: The issues are basically: 20 Permeability, porosity, drainage area, or the area in 21 which the produced water could move toward over time.</p> <p>22 MR. SHEA: The only thing --</p> <p>23 MR. PAYNE: Mr. Chairman, may I?</p> <p>24 CHAIRMAN JOHNSON: Mr. Payne, go ahead.</p> <p>25 MR. PAYNE: I'd like to move forward. I think</p> <p style="text-align: right;">Page 105</p>

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<p>1 it's not Mr. Shea that we need to satisfy, it's this 2 Board. 3 I'd like to make a motion we accept this witness 4 as an expert and move this forward, noting Mr. Shea's 5 concern. But let's move this. 6 MR. SHEA: Could I just raise one final -- 7 MR. PAYNE: No. I would like to move this 8 forward. 9 CHAIRMAN JOHNSON: Okay. Is there a second? 10 MR. HAROUNY: I'll second it. 11 CHAIRMAN JOHNSON: Any discussion among the 12 Board? 13 All those in favor say "Aye." 14 THE BOARD: Aye. 15 CHAIRMAN JOHNSON: Anyone opposed? 16 We'll recognize Mr. Allin as an expert in 17 geology and hydrology. 18 If you've got objections, if we get into any of 19 those questions on that portion of hydrology you are 20 concerned about, Mr. Shea, as it applies to the UIC 21 application, please raise them at that time. The Board 22 will take that into account. 23 MR. SHEA: It's simply a question of fluid 24 dynamics. 25 CHAIRMAN JOHNSON: Go ahead, then, Mr. Clawson.</p> <p style="text-align: right;">Page 106</p>	<p>1 outcropping high on the top of the Book Cliffs, that's 2 the Wasatch and Green River formations, including down 3 into the yellow band. 4 There's a large green band in the northern half 5 of this document or this figure. That's part of the 6 upper cretaceous. The lighter band of green is mainly 7 the Mancos shale outcrop along the band below the foot of 8 the Book Cliffs. This is all a relatively flat area. 9 But in general, then, coming into the eastern 10 and southern parts of the map, there's another dark green 11 band, representative of about the Dakota Sandstone and 12 Cedar Mountain formations. These are the first aquifers 13 and/or petroleum-bearing porous formations beneath the 14 Mancos shale. 15 Then there's another band below that, a dark 16 gray pretty much on this. It's the Morrison Formation. 17 It's generally a confining bed. It's mainly shale and 18 plastic, high clay content shale beds. 19 Then below that, there are some of the more 20 porous elements of the Middle Jurassic formations. These 21 are bands represented here going out into a dark brown 22 color. These are mainly composed of two types of beds. 23 There's basically fossilized sandstones typical of the 24 Entrada Sandstone and the Wingate Formation. And there 25 are also fluvial tile beds, or beds that were laid down</p> <p style="text-align: right;">Page 108</p>
<p>1 MR. CLAWSON: Thank you, Mr. Chairman. 2 I'd refer you to Exhibit No. 7. 3 Have you examined this exhibit and are you 4 familiar with it? 5 MR. ALLIN: Yes. 6 MR. CLAWSON: Can you please tell us what this 7 exhibit is and why it's important? 8 MR. ALLIN: This exhibit is a geologic map of 9 most of Grand County and a little bit of southern Uintah 10 County and a little bit of northern San Juan County. 11 What it depicts is -- in very colorful fashion, 12 it's quite busy -- but it color codes the outcrop bands 13 of various ages of rock throughout the county. It also 14 has a township and range grid on it. And the townships 15 are about three-quarters of an inch on the side, and they 16 are visible through there as a checkerboard or a gridded 17 pattern. 18 There are also topographic contour lines on it, 19 which indicate the relative elevations of the ground 20 surface in addition to the color coding, which indicates 21 what the formation is at that particular elevation on the 22 outcrop. 23 In general, we're looking at -- towards the 24 north end of the map, the brighter colors -- the orange 25 is tertiary rocks. The rocks of the Uinta Basin</p> <p style="text-align: right;">Page 107</p>	<p>1 by rivers, like the Kayenta Formation. 2 Below that, in the very southern part of the 3 map, you actually see some of the outcrops of painted 4 blue on this particular figure. But that's Permian and 5 Pennsylvanian rock. 6 Now, when the whole picture is put together, 7 what it shows is that -- and what I tried to depict by 8 placing arrows, red arrows, on this map -- is, in 9 general, water movement within the confined aquifers of 10 the, what's called the Glen Canyon group, which -- if all 11 the components of it are present, including the Navajo 12 Sandstone, the Kayenta Formation, and the Wingate 13 Formation -- or the Wingate Sandstone. 14 The reason this particular map was put together 15 was primarily to satisfy the Grand County Planning 16 Commission that activities at the Harley Dome site and 17 related to this injection well permit would be isolated 18 from and not pose any threat to the watersheds that serve 19 the populated areas of Grand County, which are primarily 20 the Spanish Valley and Castle Valley areas, because they 21 use -- and they know they use -- the lower parts of the 22 Glen Canyon group as parts of their water supplies. 23 And so what this picture shows is, for one 24 thing, is that in general the water movement in the 25 confined aquifers in the Glen Canyon group -- or the JTr,</p> <p style="text-align: right;">Page 109</p>

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<p>1 the way it's labeled on this figure -- is that water 2 movement is northward from the Uncompahgre Uplift, which 3 is the brown/black areas. And it's labeled on here just 4 north of the -- on the east side of the diagram. And 5 also, just beyond where the Colorado River is labeled in 6 white -- so you can kind of see it against the dark 7 background -- well, that dark background that's painted 8 on there is the outcrop of the Kayenta Sandstone. And 9 there's a large outcrop band up in that area above the 10 river level.</p> <p>11 In general, it's showing that these outcrops get 12 younger as they go northward. The elevations decrease 13 and increase. But in general, all of the beds are 14 dipping. Generally at the very far right-hand edge of 15 this figure, they're dipping mainly northward. But in 16 general, everything beyond that across the Uncompahgre 17 Uplift is dipping northwesterly. So there's a tilt on 18 all of the formations involved, porous, or nonporous, 19 confining beds, and aquifers alike. They are all tilted 20 in the Harley Dome area to the northwest. And in 21 localized areas, due to wrinkles in the structure, which 22 are kind of too small to show on a scale, this scale of 23 map, there is a general tilt of everything to the north 24 or northwest.</p> <p>25 It's very similar from the La Sal Mountains,</p> <p style="text-align: right;">Page 110</p>	<p>1 indicated on the right-hand side in about the upper half. 2 "Harley Dome Site" with a little black circle, a heavy O, 3 is where the well site is.</p> <p>4 MR. CLAWSON: Okay. I'd like to refer you to 5 Exhibit -- well, are you done on Exhibit 7?</p> <p>6 MR. GILL: I can't see it. I see it now.</p> <p>7 CHAIRMAN JOHNSON: Let's move ahead.</p> <p>8 MR. GILL: Wait a minute.</p> <p>9 MR. SHEA: It's just above the arrow.</p> <p>10 MR. GILL: I thought you were south of the 11 Paradox Fold. You are north of it. I'm fine.</p> <p>12 MR. CLAWSON: Okay.</p> <p>13 Continue.</p> <p>14 MR. ALLIN: And that is the only key element I 15 wanted to make -- after trying to get everybody oriented 16 to what they are looking at here -- is that the key 17 elements that were important to Grand County with their 18 developed watershed versus the undeveloped one in the 19 Harley Dome area, is that these things are isolated and 20 segregated very completely by two major geological 21 features that cross through this map. One is the north 22 margin of the Paradox Fold and Fault Belt where it meets 23 the Uncompahgre Uplift.</p> <p>24 There's a large boundary fault in this area and 25 a major synclinal structure called the Savior's Wash</p> <p style="text-align: right;">Page 112</p>
<p>1 which appear with these very light-colored dots down in 2 the far southeast or far lower right corner of this 3 figure, and it shows a couple of arrows emanating from 4 those areas. That's the top of the La Sal Mountains.</p> <p>5 MR. CLAWSON: Let me interrupt you.</p> <p>6 How do you know that the water flows north?</p> <p>7 MR. ALLIN: The water flows north because of the 8 recharge area being on the upland areas of the 9 Uncompahgre Uplift in western Colorado. The water enters 10 into the formations. They are dipping northward. It 11 simply follows on a gravitational flow. And once it gets 12 into a confined aquifer position, once it gets past the 13 canyons of the Colorado River and becomes confined, then 14 the water flow continues northward, mainly because 15 there's lower pressures that have been measured that 16 isn't shown on this map in wells that I've cataloged in 17 part of my research for the background material that's 18 submitted with the permit. I have to know what the 19 relative water formation pressures are in a single 20 aquifer over a broad area in order to predict which way 21 water or hydrocarbons are going to be moving in these 22 porous zones.</p> <p>23 MR. CLAWSON: Let me ask you: Is the subject 24 well site indicated on this map?</p> <p>25 MR. ALLIN: Yes. The subject well site is</p> <p style="text-align: right;">Page 111</p>	<p>1 syncline. This forms a barrier from anything going on in 2 the Uncompahgre Uplift, Uinta Basin aquifer, from 3 anything happening in the southern part of the map, which 4 is the aquifer related to the La Sal Mountains and the 5 valleys in the Moab area.</p> <p>6 There's a second barrier, which you can see it's 7 marked as a barrier in the southern half of map in a 8 heavy dot-dashed line, similar to what was put on the 9 Savior's Wash syncline. But this is a salt wall barrier, 10 which is actually continuous from the east margin of the 11 map in a northwesterly direction through Sinbad Valley, 12 Fisher Valley, then Salt Valley, which is within Arches 13 National Park. So there's two elements that eliminate 14 and protect the entire area as far as the subsurface 15 aquifers from being connected.</p> <p>16 MR. CLAWSON: Now I refer you to Exhibit No. 8. 17 Have you examined this exhibit and are you familiar with 18 it?</p> <p>19 MR. ALLIN: Yes.</p> <p>20 MR. CLAWSON: Could you please tell us what this 21 exhibit shows us?</p> <p>22 MR. ALLIN: This exhibit shows two stratigraphic 23 columns, which are basically depictions of the rock 24 layers in two areas. One is at the underground injection 25 control, or UIC permit location at Harley Dome, and this</p> <p style="text-align: right;">Page 113</p>

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<p>1 is from outcrop mapping done by the US Geological Survey.</p> <p>2 And then -- so that's the stack at Harley Dome.</p> <p>3 On the left side of the picture is mapping that</p> <p>4 was done by the Utah Geological Survey, and it's more</p> <p>5 representative of the stack of rock in the Moab and Salt</p> <p>6 Valley Anticline/Arches National Park area. What this</p> <p>7 does is contrast these two stacks of rock. It also</p> <p>8 indicates other things.</p> <p>9 Let's go back to the stratigraphic column on the</p> <p>10 right side of the figure. What this shows is, first of</p> <p>11 all, that coming from the top down, that the surface</p> <p>12 formation, which was depicted on the previous exhibit --</p> <p>13 as busy as that was -- is the surface out there is the</p> <p>14 lower-most part of the Mancos shale and right at the top</p> <p>15 of the Dakota Formation. Then going down through that,</p> <p>16 of course, the other formations I mentioned, the various</p> <p>17 members of the Morrison Formation.</p> <p>18 And then the way I set up this particular</p> <p>19 comparison of these strat columns is the datum I used was</p> <p>20 the base of the Summerville in this area, which is a</p> <p>21 continuous formation across both.</p> <p>22 Then below that, once I get below that</p> <p>23 stratigraphic datum, then I show the position of the</p> <p>24 Entrada Sandstone, which is labeled on the east section</p> <p>25 here, "Low BTU Gas Zone" because that is what the BLM is</p> <p style="text-align: right;">Page 114</p>	<p>1 occur and is part of the aquifer system in the Moab area.</p> <p>2 And from that section on down, it's similar.</p> <p>3 You see the Kayenta. And then the Wingate Sandstone is</p> <p>4 down there. And then a lot of other older sedimentary</p> <p>5 formations, which aren't present at Harley Dome.</p> <p>6 The thing to take away from this, partly, is one</p> <p>7 of the key elements of the aquifers that are developed</p> <p>8 for potable water in the Spanish Valley area is the</p> <p>9 Navajo Sandstone. The Navajo Formation, the whole entire</p> <p>10 formation, and the superjacent Carmel are not present at</p> <p>11 Harley Dome at all. So we don't have -- the proposed UIC</p> <p>12 activity will not impact the Navajo Sandstone at all.</p> <p>13 It's completely isolated laterally. So that was a key</p> <p>14 issue here to depict, especially for the residents of</p> <p>15 Grand County.</p> <p>16 MR. CLAWSON: And this exhibit shows the upper</p> <p>17 confining zone and the lower confining zone?</p> <p>18 MR. ALLIN: Yes, that's right.</p> <p>19 MR. CLAWSON: At the UIC location?</p> <p>20 MR. ALLIN: It also indicates that the surface</p> <p>21 formations in the Moab area start with the Navajo. So</p> <p>22 the Entrada is not buried in the Moab area at all, and</p> <p>23 it's air filled.</p> <p>24 MR. CLAWSON: Now, let's move on to Exhibit</p> <p>25 No. 9. Are you familiar with this exhibit and have you</p> <p style="text-align: right;">Page 116</p>
<p>1 concerned with in their correlative rights in this</p> <p>2 formation, the Entrada Sandstone, which is superjacent,</p> <p>3 not only the proposed injection zone, but also the</p> <p>4 identified confining zone for the injection zone.</p> <p>5 Getting to that, the next formation down is the</p> <p>6 Kayenta Formation. That's the confining zone identified</p> <p>7 in this permit to confine all of the produced water that</p> <p>8 is injected and intermixed with the in situ water in the</p> <p>9 proposed injection zone in the Wingate Sandstone.</p> <p>10 So we've got that layer, then the proposed</p> <p>11 injection zone, the Wingate Sandstone. Below that, a</p> <p>12 subjacent confining layer known as the Chinle, which is a</p> <p>13 Triassic Formation. Below that, in the area of Harley</p> <p>14 Dome, there is the granite basement. There is no other</p> <p>15 sedimentary formations present because of the unique</p> <p>16 stripping of those from the Uncompahgre Uplift.</p> <p>17 Now, to contrast that, on the left side of the</p> <p>18 diagram the stack is fairly similar. As you get down,</p> <p>19 the Morrison is there within that area. The Summerville</p> <p>20 is marked on it. The Entrada is there.</p> <p>21 And then we see a couple of things that aren't</p> <p>22 present at Harley Dome. There's the Carmel Formation and</p> <p>23 the Navajo Formation. And the Navajo, of course, was of</p> <p>24 concern to the residents of Grand County because that is</p> <p>25 part of their aquifer system. The Navajo Sandstone does</p> <p style="text-align: right;">Page 115</p>	<p>1 examined it?</p> <p>2 MR. ALLIN: Yes.</p> <p>3 MR. CLAWSON: Can you please tell us what this</p> <p>4 is and what it shows?</p> <p>5 MR. ALLIN: This is a smaller scale map from</p> <p>6 Exhibit -- was it 2, the previous geological map?</p> <p>7 MR. CLAWSON: I think that would be Exhibit 5.</p> <p>8 MR. ALLIN: Exhibit 5, I'm sorry.</p> <p>9 This depicts similar information, but it's</p> <p>10 scaled down to the point where a mile here is about, oh,</p> <p>11 5/8 of an inch, or so. So this narrows in more</p> <p>12 specifically on the square miles and the townships</p> <p>13 immediately around the Harley Dome proposed injection</p> <p>14 well.</p> <p>15 It is labeled in about the middle of this map,</p> <p>16 where it says "Harley Dome 1" and with a black dot just</p> <p>17 to the left of Harley Dome 1. That is actually the</p> <p>18 physical location of the well. There's also another</p> <p>19 spot -- there's two other spots label on the map. One is</p> <p>20 a well that was used -- that I used and relied upon</p> <p>21 extensively in the original UIC permit, which was filed</p> <p>22 last -- in 2009. And it is what I used for an offset</p> <p>23 well to examine and try to predict water quality,</p> <p>24 reservoir quality at the injection well site. And that</p> <p>25 well is called the Lansdale Government 13. And so</p> <p style="text-align: right;">Page 117</p>

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<p>1 there's some information from that well that indicates 2 that the -- where the elevation of the injection zone is. 3 And in that well, I believe it's -- 3637 is labeled for 4 JW, which stands for Wingate Sandstone. And in the 5 Harley Dome 1 well, which was drilled last year -- or 6 this year, earlier this year in May, just to gain 7 additional information on all of the geology here, verify 8 it at the injection well site. And this well was an 9 exploratory well to begin with, but planned to be used as 10 a conversion to injection if it qualified.</p> <p>11 And so at the injection well site, once it was 12 drilled and logged, we were able to determine that the 13 top of the Wingate Sandstone had an elevation of about 14 3532.</p> <p>15 Now the other spot that's labeled on this map, 16 and the surficial geological formations, is noted with a 17 little X down in the lower right quadrant of the map 18 along the Colorado River, which is -- I guess, "River" is 19 labeled, it doesn't say Colorado. But at any rate, that 20 is the Colorado River as it comes out of the Ruby Canyon 21 at the far east edge of the map and then exits down 22 through Westwater Canyon at the bottom center of the map.</p> <p>23 But the nearest outcrop of the Wingate Sandstone 24 that's of concern, since it's the injection layer that's 25 proposed in this permit, the nearest spot is 5.8 miles to</p> <p style="text-align: right;">Page 118</p>	<p>1 Notice how, although the Kayenta in this area is 2 only about, somewhere over 100 feet thick, it covers a 3 large area on this map. It covers, oh, probably fully 25 4 percent of this area down here above the river on the 5 plunge of the Uncompahgre Uplift. The reason for that is 6 it's a very, very hard, dense, flagstone type formation. 7 Years of abuse by the Colorado River glaciers, the forces 8 of erosion, have done very little to erode much of the 9 Kayenta Formation off of the plunge of the Uplift.</p> <p>10 You also see, even at this scale of this map, 11 any major faults would be labeled on it. There's a few 12 up here in some of the green areas by the freeway. But 13 on that Kayenta outcrop, you don't really see a lot of 14 marked black lines, which indicate faults and fractures, 15 and things. And that's because it's really a very dense 16 formation. It's very competent. It's got some clay 17 minerals in it, which -- the other attributes of the 18 formation I go into with another figure, and that has to 19 do with the modern logs that were run on the new well 20 that was drilled out there earlier this year. That's 21 really what this map is designed to show.</p> <p>22 And also, there are red lines on here, which are 23 contour lines originally drawn to illustrate what the 24 structural surface of these formations is like at any one 25 level. They're originally drawn by the authors of the</p> <p style="text-align: right;">Page 120</p>
<p>1 the southeast of the proposed injection well site. And 2 there is an outcrop at the top of the Wingate Sandstone, 3 and it dips down into the river. And its elevation at 4 that point is about 4350. So it's about 800 feet higher 5 in elevation at the river level at its nearest outcrop 6 point from where it was intersected in the well that was 7 drilled to evaluate this project and develop the data 8 that was necessary to fulfill the requirements of the 9 permit and so that they could be adjudicated by the staff 10 here.</p> <p>11 So the elements of this are that the river level 12 is in the 40 -- and the outcrop -- is about 4350 feet. 13 The level of the formation where it is proposed for 14 injection is 800 feet in elevation lower than that. So 15 there is a substantial elevation difference.</p> <p>16 Also, the other thing to look at on this map, 17 the Wingate Sandstone. As you can see along the river at 18 the east margin of the map, there's a little designated, 19 and it's kind of a dark green color. It says "TRW," 20 which stands for Triassic Wingate. And there's a band of 21 that rock on both sides of the river in Lower Ruby 22 Canyon. Above that, there's a turquoise-colored band 23 that's labeled "TRK," which is the Kayenta. That is the 24 proposed, or the confining, layer that confines the 25 Wingate aquifer.</p> <p style="text-align: right;">Page 119</p>	<p>1 map of the Dakota Sandstone and then projected where the 2 Dakota is absent in the southeastern, or the lower 3 right-hand corner of the map. They're projected down 4 350 meters above the Wingate. So basically, the contours 5 show you the relative shape of areas of equal elevation 6 of all of the formations. There's slight variations as 7 you go down through the stack. But in general, these 8 lines show areas of equal elevation.</p> <p>9 So if you follow the nearest line, which is 10 actually labeled "1500" on this figure, from the upper 11 right-hand corner, follow that line down with your eye 12 over towards where "Harley Dome 1" is labeled. And that 13 bends around. It bends northward over a structural axis 14 that's labeled on this map, "Bitter Creek Anticline," 15 flexes down downward, southward through the Bryson Wash 16 syncline, which is -- right on the access of that is 17 where the Harley Dome 1 was spotted and drilled.</p> <p>18 And then it bends back northward around the 19 plunge of Harley Dome, where the little helium reserve is 20 located, which is confined to a very small area. It's 21 about 200 acres up there, with a very low pressure helium 22 reserve that's got about six percent methane in it, a 23 couple percentage points of helium, and the rest is 24 nitrogen.</p> <p>25 But if you follow that around down through the</p> <p style="text-align: right;">Page 121</p>

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<p>1 map, that contour line is basically going to indicate if 2 you inject, even almost unlimited amounts of injectate, 3 into the formations, it's going to be almost impossible 4 to raise the formation pressure of the Wingate Sandstone 5 significantly enough to ever back water across that line 6 anywhere southeast of that line.</p> <p>7 And that's the key thing to take away from this 8 particular figure. It just reaffirms in a more focused 9 area what the configuration of the formations are, what 10 the relative elevation of them is, and what the relative 11 elevation is on outcrop between the river area and the 12 proposed well.</p> <p>13 And here at this scale, you can see the extra 14 little wrinkles in it that are like the Harley Dome, the 15 Bryson Wash syncline, and the Bitter Creek antine. 16 Those are little wrinkles you couldn't see on the other 17 map. But here, you can see that now -- and the way water 18 behaves in an injection situation here is it will move at 19 right angles to these contour lines. So what's going to 20 happen is water injected into this will gradually -- and 21 this is very gradually. This stuff moves at a couple of 22 feet over periods of years, depending upon the amount of 23 injection. But it would tend to move down the Bryson 24 Wash syncline or northerly from the injection site.</p> <p>25 MR. CLAWSON: Could you just elaborate just a</p> <p style="text-align: right;">Page 122</p>	<p>1 in the well in order to introduce more cement behind 2 casing and straighten up the one little aspect that had 3 to be fixed.</p> <p>4 During that operation, we managed to get with a 5 contractor that's running wire line equipment down into 6 the well. We were able to establish an accurate level of 7 the static fluid level within the well by running the 8 tools in and determining how far from the surface it was.</p> <p>9 During those runs, on June 28, earlier this 10 year, we found that the static fluid level in the Wingate 11 was about 600 feet. This means that it's substantially 12 subnormally pressured. The normal pressure, even on 13 fresh water in the formation, would be -- the water 14 column, it would be almost full -- would indicate that at 15 that depth you would have probably about six or 16 700 pounds per square inch formation pressure.</p> <p>17 What we found, knowing the elevation of that 18 being down 600 feet from the surface, is the formation 19 pressure at the top perforation that had been made 20 earlier in the month was about 327 pounds per square 21 inch.</p> <p>22 What I found in my experience in evaluating 23 hydrodynamic reservoirs for production of oil and gas is 24 that very commonly they have these attributes in common. 25 They are subnormally pressured, drastically subnormally</p> <p style="text-align: right;">Page 124</p>
<p>1 little bit further on something you just stated in terms 2 of when you are looking at the contour line -- that would 3 be the 1500 contour line here -- it's nearly impossible 4 for the water -- that injected water to move to the 5 southeast? I mean, I'm paraphrasing but...</p> <p>6 MR. ALLIN: Yes, that's right.</p> <p>7 MR. CLAWSON: Could you explain that a little 8 bit further, why would it be impossible for the water to 9 move southeast?</p> <p>10 MR. ALLIN: It has to do with the fact that the 11 Wingate Sandstone and the measurements that were made in 12 the well that was drilled last May, and the measurements 13 that were made since that time during the process of 14 completing it and testing it. And what we found there is 15 that once we got the zone open so we could production 16 test it by perforating the casing unit and isolate it 17 only within the Wingate Sandstone -- because one of the 18 requirements of the UIC permit is that the permittee 19 provide accurate information and characterize the connate 20 water, or the water resident within the proposed 21 injection zone.</p> <p>22 So once that was done, then we had to go back 23 and we were required to do -- or the client was required 24 to do some remedial work on its casing cement. At that 25 point, additional perforations had to be made further up</p> <p style="text-align: right;">Page 123</p>	<p>1 pressured. What that indicates is that water is moving 2 there. It may not be moving quickly, but it's in a 3 process of moving. There's a constant drain of water. 4 You add water to it, you are not going to increase that 5 formation pressure significantly. And I'm talking about 6 thousands of barrels a day with the height of the porous 7 formation beneath it, which we've got 337 feet of gross 8 formation, 552 perforations in it, significant porosity 9 that I'll get into later. But it's above 20 percent.</p> <p>10 The water diffuses into that at such a rate that it will 11 not back up pressure that will initiate crossing contour 12 lines, for instance. It's going to disseminate 13 laterally, and especially favor anything downdip. It's 14 going to try to go lower in elevation or laterally. It's 15 certainly not going to go uphill.</p> <p>16 MR. JENSEN: Having said that, what's the 17 impact, then, or where does the 6500 barrels maximum per 18 day -- does that have something to do with what you've 19 analyzed, then, and what capacity this has to take and 20 absorb?</p> <p>21 MR. ALLIN: Yes. And it has to do with -- and 22 there's a figure on that in here, too, or an exhibit. It 23 has to do with testing that was done on the well with a 24 large pump and significant amounts of fluid. And it's 25 called a step-rate injection test. It's a requirement of</p> <p style="text-align: right;">Page 125</p>

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<p>1 the permit that we establish what a frac gradient in the</p> <p>2 proposed injection zone is. That is done by having</p> <p>3 enough fluid on hand -- and in this case fresh water,</p> <p>4 because we had to know the precise density of that water</p> <p>5 in order to get an accurate read on it.</p> <p>6 But it's pumped into the well at increasingly</p> <p>7 faster rates. But they are held for ten to 15 minutes at</p> <p>8 each plateaued rate until you get a break point, which</p> <p>9 indicates the creation of a fracture by the pumping</p> <p>10 operation. At that point, you can determine a frac</p> <p>11 gradient. You can also determine what the maximum</p> <p>12 allowable injection pressure, MAIP, is going to be. And</p> <p>13 that is done by rule, and the Division sets that. It's</p> <p>14 based upon this test.</p> <p>15 And so from that point on, even though, in all</p> <p>16 deference to Mr. Shea and his question of whether or not</p> <p>17 I'll be around once the well is in operation, I will</p> <p>18 probably not be involved in day-to-day operations of it.</p> <p>19 But I know that by rule, and if the operation of the</p> <p>20 facility is in compliance, the injection pressure</p> <p>21 established by that test will never be exceeded. And so</p> <p>22 under those circumstances, it's a known fact that if no</p> <p>23 fracture is being induced, it's not going to go out of</p> <p>24 zone.</p> <p>25 There's also one little point in addition to</p> <p style="text-align: right;">Page 126</p>	<p>1 what -- and I didn't answer your question. I'm sorry</p> <p>2 about that.</p> <p>3 The step-rate injection test also, at the point</p> <p>4 where the fracture was induced, was at about, I think --</p> <p>5 we'll get to that figure -- but it was about 4 1/2 or</p> <p>6 5 barrels per minute. So if the rules typically say</p> <p>7 that, you know, the MAIP operational limit is going to</p> <p>8 be, oh, 15 to 20 percent of that number -- say it's three</p> <p>9 hundred and, whatever, sixty PSI, or something, then</p> <p>10 that's going to be about 3 1/2 barrels a minute. So if I</p> <p>11 just multiply that out by 440 minutes in a day, then I'll</p> <p>12 come up with somewhere around 6000 barrels. That's where</p> <p>13 it comes from. It's a figure that's not set in stone, by</p> <p>14 any means. It's not even regulated. The only thing</p> <p>15 that's regulated is the surface pumping pressure to avoid</p> <p>16 inducing fractures. And so wherever that falls out, that</p> <p>17 rate -- disposal rate, it's not a governed number.</p> <p>18 MR. JENSEN: Thank you.</p> <p>19 MR. CLAWSON: Thank you. Let's move on to</p> <p>20 Exhibit No. 10. Are you familiar with this exhibit?</p> <p>21 MR. ALLIN: Yes.</p> <p>22 MR. CLAWSON: Can you please tell us what it is?</p> <p>23 MR. ALLIN: What this is, is a four-page</p> <p>24 exhibit. And what it is, is an annotated picture of the</p> <p>25 downhole/open hole well log that was recorded by</p> <p style="text-align: right;">Page 128</p>
<p>1 this, is that although we didn't test it and induce a</p> <p>2 fracture into the overlying confining zone -- which is</p> <p>3 kind of something you want to avoid, anyway, in the area</p> <p>4 of an injection well. But if I had a point where I could</p> <p>5 determine a frac gradient in the Kayenta Formation</p> <p>6 outside of the area of this injection well, it would</p> <p>7 probably be substantially higher than what's within the</p> <p>8 porous injection zone, just because of the mechanical</p> <p>9 properties of the confining zone being substantially more</p> <p>10 robust than this porous injection zone.</p> <p>11 And so as long as the well is operated within</p> <p>12 the rules, there really isn't a chance that you are going</p> <p>13 to start backing water across this key contour line on</p> <p>14 this diagram, which here it's labeled "1500." But that's</p> <p>15 what eliminates a possibility of moving water updip. It</p> <p>16 would take -- you'd have to be operating the facility</p> <p>17 well out of its design, or its, even, ruled parameters.</p> <p>18 MR. JENSEN: So help me to understand -- and I</p> <p>19 apologize -- but the 6500 that you came up with, that's</p> <p>20 the result. But on a day-to-day operation, are they</p> <p>21 going to simply be measuring at 6500, the top part of</p> <p>22 their watching pressure, and if they hit the pressure,</p> <p>23 irrespective of gallons, that's it?</p> <p>24 MR. ALLIN: You are exactly right. And that's</p> <p>25 how the MAIP is set, and you cannot exceed that. And</p> <p style="text-align: right;">Page 127</p>	<p>1 Halliburton in the well on May 22. This is when the well</p> <p>2 is open hole.</p> <p>3 I've also annotated it with some information</p> <p>4 about the formation tops. You see very detailed</p> <p>5 information on various formation tops that are similar to</p> <p>6 what was on the schematic diagram of the stratigraphic</p> <p>7 column. The elements that were on that stratigraphic</p> <p>8 column were verified by the drilling of this well. And</p> <p>9 the various curves on this long chart, basically, enable</p> <p>10 experts to be able to determine various aspects of the</p> <p>11 quality of the rock that's being measured by these</p> <p>12 curves.</p> <p>13 I've also annotated where the water samples,</p> <p>14 that are also exhibits that were submitted, were taken,</p> <p>15 either during drilling or post drilling. And those are</p> <p>16 annotated at the points where they were set on the --</p> <p>17 where they were depth-wise, and then the information on</p> <p>18 what the quality was.</p> <p>19 So on the first page of this Exhibit 10-1,</p> <p>20 starting at around -- the top of the figure, I think,</p> <p>21 starts at a log depth of around 800 feet, or so. The</p> <p>22 first formation cross is a lower member of the Morrison.</p> <p>23 Then there's a Summerville Formation. These are on the</p> <p>24 strat column.</p> <p>25 Then the first porous formation that shows up is</p> <p style="text-align: right;">Page 129</p>

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<p>1 the Entrada Sandstone here, thrown in with the Moab Mbr 2 of Curtis -- but at any rate, what everybody would call 3 the top of the Entrada Sandstone. This is the same 4 formation that nearby on the Harley Dome structure 5 itself, the BLM is concerned about their little helium 6 reserve over there.</p> <p>7 And so what this shows is the curves kind of 8 have a predictable behavior. The far right track is a 9 natural gamma ray curve. The further to the right that 10 curve goes, the cleaner, or less shaley, the formation 11 is, the more porous it's liable to be. So sandstones, 12 like the Entrada, have a signature with a curve far to 13 the left of the tracks there.</p> <p>14 The middle set, which are the log rhythmic 15 curve, are resistivity measurements. And in shaley 16 formations, they're typically a little more resistive, 17 push the curves to the right. The sandy formations, 18 especially if they are full of brine water, have very, 19 very low resistivity -- here measuring in just a couple 20 of ohms, which is extremely low.</p> <p>21 So as you cross the line into the, depth-wise, 22 down the center column for instance, the depth of the top 23 of the Entrada at 885, you see the resistivity curves 24 just collapse to the left. The curves in the right-hand 25 column, there's a red curve, which is a neutron porosity</p> <p style="text-align: right;">Page 130</p>	<p>1 of drilling into the top of the Entrada. We'd just 2 stopped at the top. The water filled up overnight, which 3 included everything above it: Sandstones and the 4 Morrison, the -- I think we had some of the -- Morrison 5 was exposed, and so any porous elements in that. So 6 anything below surface casing was exposed. This was 7 below 225 feet at the site. The quality of that water, 8 on a mixed basis, was over 30,000 parts per million total 9 dissolved solids. This is water within 220 feet of the 10 surface down to about 850. That was an overnight fill. 11 We got a sample of it. There wasn't a lot of water, 12 either. Nothing there qualifies for a significant, 13 usable water, water supply, because it doesn't yield much 14 water. Also, with that salinity, it doesn't qualify as a 15 USDW. In fact, due to the lack of water in the Dakota, 16 which periodically in a few spots -- remote spots -- out 17 in the Greater Cisco field, there are some instances of 18 fresh water in the Dakota at very shallow depths. At 19 Harley Dome, they weren't fortunate enough to find any. 20 I mean, there's really no USDWs in any formation that was 21 drilled in this well.</p> <p>22 To progress down -- the only thing to say on 23 water quality again, there was a water sample taken while 24 the well was drilling at about a thousand feet, and 25 that's marked on this first page of this exhibit. And</p> <p style="text-align: right;">Page 132</p>
<p>1 curve, and a black curve, which is a density porosity 2 curve.</p> <p>3 In porous formations, if these curves are set up 4 and calibrated correctly, they will track almost right 5 over each other. Unless gas is present, natural gas were 6 present, they would cross over. That red line would 7 cross over the black line to the right.</p> <p>8 Here we see them tracking. We don't see them 9 tracking above in the Tidwell or the Summerville, and 10 that's because they involve a lot of clay content. You 11 see the gamma ray move over to the right. And that is 12 more radioactive, indicative of shaley rock, which is 13 mainly -- is developed in -- it's impermeable rock, in 14 general. And what it does to the neutron density curve 15 is the neutron curve gets pushed to the left and starts 16 separating from the density curve. And the way you would 17 read the average porosity in there is to average between 18 them.</p> <p>19 But as soon as you get on top of the Entrada, 20 they track each other. You see fairly high porosity. 21 The porosity units are from minus ten to plus 30. So 22 it's 20 percent porous, and there 15 to 20.</p> <p>23 And down through that -- now the only other 24 thing to point out about the first page of this is there 25 was a water sample taken right about after the second day</p> <p style="text-align: right;">Page 131</p>	<p>1 the water quality there during drilling, which then it's 2 starting to entrain some Entrada water, it's 36,000 parts 3 per million. So again, much more saline than the cutoff 4 that would be necessary to preclude it from being used as 5 an injection zone, which is a 10,000 parts per million 6 TDS.</p> <p>7 Now, to go to the next page. We finally get 8 to -- let's see. About 1143, I have marked the top of 9 the Kayenta Formation. This is now the base of the 10 Entrada. You start seeing some changes in the behavior 11 of the curves here. And the Kayenta Formation is the 12 confining zone, or the Wingate.</p> <p>13 Within these curves, you can see a couple of 14 things happen. The gamma ray curve in the left track 15 gets much more jagged than where it was through the 16 Entrada Formation. It's showing more radioactive clay 17 minerals, and the resistivities start to go up, showing 18 it's lack of porosity, more resistive. And then the 19 neutron density curves, the red and black curves in the 20 right track, they start to separate again. They are 21 separating because there's a lot of clay mineral in this 22 formation again. Unlike the Entrada, which is a 23 fossilized sand dune, which is almost pure sand, the 24 Kayenta has a significant amount of sand, but also has a 25 significant amount of clay that was deposited in braided</p> <p style="text-align: right;">Page 133</p>

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<p>1 stream channels. And it's woven together into this very 2 hard overall rock, which makes great flagstone, dimension 3 stone. In fact, the Park Service frequently uses it for 4 building visitors' centers, and did around -- during the 5 30s, CCC/WPA crews -- but, I digress.</p> <p>6 So what this confining layer measurements from 7 these new logs show is that if I accumulate the amount of 8 rock that has virtually no porosity in it -- and I just 9 accumulated what has less than two percent density 10 porosity, which -- that's a type of rock where you're 11 never going to get any fluid out of it, you're not going 12 to be able to pump fluid through it or into it unless you 13 fracture it artificially, and there's 36 net feet of that 14 very type rock within this 130-foot zone, or so, that's 15 the confining layer that we're using as the confining 16 layer for the injection zone.</p> <p>17 At the very bottom of the figure, I show the top 18 of the Wingate formation at a depth of 1342. Here 19 there's another fairly abrupt change in the behavior of 20 these curves. The gamma ray curve moves to the left. It 21 cleans up. It's sandy. The resistivity is collapsed 22 back into a couple of ohms. The density and neutron 23 porosity curves jump right over into the 22 percent range 24 and start tracking again.</p> <p>25 There's notations here on water samples again,</p> <p style="text-align: right;">Page 134</p>	<p>1 will be open for injection if the permit is granted. So 2 there's, I think, over 337 gross feet. There's 552 holes 3 over about 130 net feet. And that's what those show.</p> <p>4 Now, the other things to at least read from this 5 presentation, to quickly summarize, is that within the 6 Wingate under the gross 337 feet, there was 43 feet of 7 rock with a density porosity greater than 20 percent. 8 This is fabulous reservoir rock. I'd love to see this 9 stuff in a -- full of hydrocarbons someplace.</p> <p>10 And then the next category had a cutoff of 16 11 density porosity, and there's 48 net feet of that.</p> <p>12 Then there's another 130 feet of rock in this 13 well in this injection zone that's greater than 14 ten percent porosity. All of that qualifies as reservoir 15 rock. And it's 220 total feet.</p> <p>16 Now, the last page of the exhibit shows the top 17 of the Chinle Formation, which is the lower confining 18 zone. This is what isolates the Wingate Sandstone from 19 the more brittle subjacent basement rock, the granite 20 that's exposed in Westwater Canyon, for instance. And 21 this well was not -- I was supervising drilling this 22 well, and I just wanted to cut about half of it. I 23 didn't even want to drill all the way through it in order 24 so that I could see the base of it on logs. But I cut 25 about 50 feet of it and got it logged. And what this</p> <p style="text-align: right;">Page 136</p>
<p>1 overnight fill, which included mainly water from 2 everything open in the well down to 1330 feet -- or just 3 before the Wingate was opened, it had a gross water 4 quality of 35,000 ppm. And that's combined, everything 5 from the surface casing down to that point. So very 6 similar to that other overnight fill water quality 7 sample.</p> <p>8 Below that, there's a notation that after the 9 well was perforated and production tested on June 11, 10 that the water quality from a sample there -- there was 11 still a mix of lost completion fluids, but it tested at 12 34,000 parts per million. So these are very briny 13 formation fluids that occupy all the porosity in this 14 well. I mean, it's triple what the levels are that would 15 qualify it as a USDW, even by rule. And the water 16 quality that would actually be used under potable -- for 17 potable uses, unless a very complex system like 18 Mr. Stewart proposes is used to treat it, you really need 19 to be looking at water that's under 3000 parts per 20 million if it's going to be used.</p> <p>21 Now, the other thing that this shows as we go to 22 the 10-3, in the depth column there's a number of heavy 23 black lines. These are the perforated intervals that 24 were made in the injection zone in order to set it up for 25 testing. And ultimately, they will be the zones that</p> <p style="text-align: right;">Page 135</p>	<p>1 shows is all 50 feet had zero percent density porosity. 2 It's a very shaley formation.</p> <p>3 And while drilling near the base of that -- so 4 I'm mainly getting Wingate water, although there is some 5 water coming in from uphole. When the Wingate was 6 drilled, the well -- because we were drilling with air, 7 so it's basically under balanced -- so whatever fluid was 8 in the formation, whatever the connate water was, it gets 9 produced as the well was drilled. So it's easy to get 10 water samples that are clear.</p> <p>11 The water, as the Kayenta was drilled through, 12 the well was making, maybe, a couple of barrels an hour, 13 two or three barrels an hour. That rose 30 barrels an 14 hour once the Kayenta was penetrated completely and the 15 top of the Wingate Sandstone was opened. And then a 16 sample of that that was taken and analyzed, that's the 17 one where we get over 50,000 parts per million total 18 dissolved solids in that. So it's a very briny water, 19 especially for this depth. And so it's been -- it's 20 something that would have been an old connate water.</p> <p>21 And so from the standpoint of everything that 22 was put together to drill the well, gather the water 23 samples, evaluate it with modern logs, it indicated -- 24 the most important thing to take away is there are no 25 USDWs at this site, and that the Wingate will make a good</p> <p style="text-align: right;">Page 137</p>

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<p>1 injection zone, the confining layers are competent. And</p> <p>2 basically, this figure would prove that to almost any</p> <p>3 expert. And I think the Division staff would agree. I</p> <p>4 can't speak for them. And that's really what the basis</p> <p>5 of all that information is.</p> <p>6 And it's very expensive to get this information.</p> <p>7 A well had to be permitted, drilled, cased, tested. All</p> <p>8 of this has to come together to provide enough</p> <p>9 information to make an intelligent decision as to whether</p> <p>10 or not this area qualifies as a site for injection well.</p> <p>11 MR. JENSEN: And this 30 barrels that you</p> <p>12 finally ended up with per hour that you were estimating a</p> <p>13 brine water, that's coming out of the Wingate?</p> <p>14 MR. ALLIN: That's coming right out of the</p> <p>15 formation.</p> <p>16 MR. QUIGLEY: Which formation?</p> <p>17 MR. ALLIN: Out of the Wingate Sandstone. And</p> <p>18 it was similar to the water we got on production testing</p> <p>19 post perfering. It was just that that was a mix of lost</p> <p>20 fresh water from displacing cement. And so -- and even</p> <p>21 on drilling, there's a little bit of water lost. But</p> <p>22 that's the reason why the production testing, had we kept</p> <p>23 the rig out there and tested another three or four days,</p> <p>24 those samples should have come up almost identical.</p> <p>25 Rather than 35/55, they both should have been around 55.</p> <p style="text-align: right;">Page 138</p>	<p>1 this data, but from a study I did of the superjacent</p> <p>2 aquifer in the Entrada, where we have more penetrations</p> <p>3 deeper in the Basin. So I could put together a more</p> <p>4 complete map of where the lower pressure regimes are.</p> <p>5 And they stagger right down northward.</p> <p>6 And so there's two elements. There's a pressure</p> <p>7 gradient that decreases northward within the confined</p> <p>8 aquifers, and there's also the physical tilt of the</p> <p>9 formations. And we know at the outcrop level that</p> <p>10 there's just air.</p> <p>11 MR. JENSEN: Following up on Mr. Harouny's</p> <p>12 question, though. This additional -- this ability to</p> <p>13 take this additional water is still confined to the</p> <p>14 Wingate?</p> <p>15 MR. ALLIN: Well, I mean, the water could be</p> <p>16 infused into other formations there, too, but just at a</p> <p>17 much slower rate. They don't have -- the logging proved</p> <p>18 that the best injection zone, just from the quality of</p> <p>19 the rock, is the Wingate Sandstone. I'm not sure if</p> <p>20 that's the answer you are looking for, though.</p> <p>21 MR. CLAWSON: The water will only be injected</p> <p>22 into the Wingate. That's where the perforations are.</p> <p>23 MR. JENSEN: And your point being that you've</p> <p>24 got the -- I can't remember -- the Chinle below and the</p> <p>25 Kayenta above?</p> <p style="text-align: right;">Page 140</p>
<p>1 MR. HAROUNY: So you don't think the Wingate,</p> <p>2 the pore space in Wingate, is already occupied by salt</p> <p>3 water?</p> <p>4 MR. ALLIN: Yes. It's completely occupied by</p> <p>5 salt water, and there were no hydrocarbon shows in it</p> <p>6 whatsoever, and none logged.</p> <p>7 MR. HAROUNY: So where are you going to inject</p> <p>8 more water into occupied space?</p> <p>9 MR. ALLIN: Well, one thing about it is we know</p> <p>10 from the fluid level that the formation pressure is only</p> <p>11 327 pounds at 1344 feet below the surface. So that means</p> <p>12 that it basically will imbibe any fluid that's added to</p> <p>13 it that creates a column of water higher than 600 feet.</p> <p>14 And it will continue to seek that level. It's just like</p> <p>15 adding stream water to a reservoir with a spillway</p> <p>16 elevation, say, of 1000 feet. You've got a line all the</p> <p>17 way around the reservoir at 1000 feet, and you keep</p> <p>18 adding water to it and it just spills over the spillway.</p> <p>19 In this case, there's a bathtub drain that's</p> <p>20 leaking. And that's really what the low pressure in the</p> <p>21 formation indicates to me and the way it will behave with</p> <p>22 all that porosity.</p> <p>23 MR. HAROUNY: So as far as hydrodynamics, it's</p> <p>24 going to move north and northeast -- northwest?</p> <p>25 MR. ALLIN: That's my conclusion, and not from</p> <p style="text-align: right;">Page 139</p>	<p>1 MR. ALLIN: Kayenta above, right.</p> <p>2 And those are the isolating layers. The well</p> <p>3 has to be operated with a packer in the hole, which</p> <p>4 ensures that the injectate enters below the top of the</p> <p>5 confining layer in the wellbore and then can only go into</p> <p>6 the perforations that were made in the casing.</p> <p>7 MR. HAROUNY: How close is this to any Entrada</p> <p>8 production, actual Entrada production?</p> <p>9 MR. ALLIN: The nearest Entrada production is in</p> <p>10 Santa Royal, which is about six miles north, where it</p> <p>11 produces both oil and gas -- well, mainly low BTU gas.</p> <p>12 And then 20 miles to the west at Cisco Dome, it produces</p> <p>13 oil.</p> <p>14 CHAIRMAN JOHNSON: Mr. Gill.</p> <p>15 MR. GILL: What's the range of the TDS of the</p> <p>16 water that's going to be injected?</p> <p>17 MR. ALLIN: Well, this is a little different</p> <p>18 than a lot of UIC permits you see, where it's a single</p> <p>19 field and the water is, you know, pretty predictable</p> <p>20 from, like, say, two dozen wells, or something. Since</p> <p>21 this is a commercial facility, they can pick up water</p> <p>22 from a variety of fields. And just the ranges that I've</p> <p>23 seen that I had to research for the permit of Utah water</p> <p>24 and Colorado water, there's a range from 15,000 ppm water</p> <p>25 to 150,000 to 200,000 ppm water, especially over at the</p> <p style="text-align: right;">Page 141</p>

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<p>1 Green River area, where there is very, very heavy brines 2 at Green River, Utah. Then there's lighter brines in 3 general that are coming from the gas wells in Piceance 4 Basin in Colorado.</p> <p>5 CHAIRMAN JOHNSON: Mr. Clawson.</p> <p>6 MR. CLAWSON: Just for clarification, you used 7 the term "connate water." Can you please tell the Board 8 what that means?</p> <p>9 MR. ALLIN: "Connate water" is fluid that 10 occupies the pore space in the rock that you assume it's 11 native, or in situ, to the rock in its current condition.</p> <p>12 MR. CLAWSON: Just so you know.</p> <p>13 Okay. Are you aware of any geologic structures 14 near the injection well that would allow the injected 15 fluids to migrate to an underground source of drinking 16 water?</p> <p>17 MR. ALLIN: No.</p> <p>18 MR. CLAWSON: Has the casing in the Harley Dome 19 No. 1 well been tested?</p> <p>20 MR. ALLIN: Yes.</p> <p>21 MR. CLAWSON: Can you tell us how?</p> <p>22 MR. ALLIN: Pressure tests were done on it 23 before drilling -- before perforations were made in it, 24 after the long string cement was first emplaced on it. 25 And then after the perforations were made and as</p> <p style="text-align: right;">Page 142</p>	<p>1 in those formations out there.</p> <p>2 But if there were, and because there are known 3 areas within 15 or 20 miles where there are some 4 anomalous fresh water and very shallow Dakota wells, 5 that's the reason it's isolated.</p> <p>6 MR. HAROUNY: And your second attempt of 7 re-introducing cement brings the cement up to this 8 surface casing -- your production casing, or long string 9 ties it up to the surface casing?</p> <p>10 MR. ALLIN: Yes, that's right. The squeeze that 11 was done on it brought the cement top from around the top 12 of the Entrada, crossing over the surface casing string. 13 I think the cement topping is about 100 feet. So there's 14 overlap of 120 feet, or so.</p> <p>15 MR. HAROUNY: Okay.</p> <p>16 MR. CLAWSON: You indicated that Exhibit 10 17 shows the zones where the well has been perforated. 18 Are the injection intervals below any safe 19 drinking water aquifer?</p> <p>20 MR. ALLIN: Yes.</p> <p>21 MR. CLAWSON: Just to kind of cover it again, 22 what will be the average rate of injection for the water?</p> <p>23 MR. ALLIN: The average rate is going to be 24 governed by the maximum allowable injection pressure. 25 And just from looking at the results of the step-rate</p> <p style="text-align: right;">Page 144</p>
<p>1 part of the operations and step-rate testing, there was a 2 second test made with the same pumps that were used for 3 the step-rate testing. And it's another required test by 4 rule. It's called an Internal Mechanical Integrity Test, 5 or an IMI. So the pumps were used to hold 1000 pounds of 6 pressure on the formation, which is probably going to be 7 almost triple any operating pressures. And that was done 8 and verified by a third-party contractor in a report 9 that's an exhibit that's deeper in the pile.</p> <p>10 MR. HAROUNY: How much of surface casing do you 11 have in this well?</p> <p>12 MR. ALLIN: Surface casing set here is about 224 13 feet.</p> <p>14 MR. HAROUNY: Is that enough to cover all the 15 potential aquifers and surface water zones adequately?</p> <p>16 MR. ALLIN: That was designed, although I 17 didn't -- even when the surface hole was being drilled -- 18 because I was there for all of the operations -- there 19 were no indications of any fresh water in the Dakota, 20 which we drilled into at about ten feet. But that 21 surface string was designed to be set through and 22 cemented back to the surface to isolate everything from 23 the top of the Morrison. So that particular casing 24 string isolates the Cedar Mountain and Dakota completely, 25 although there's no evidence that there's any fresh water</p> <p style="text-align: right;">Page 143</p>	<p>1 injection testing, that's going to be a rate of 3 1/2 2 barrels a minute, or so.</p> <p>3 MR. CLAWSON: And under what pressures?</p> <p>4 MR. ALLIN: The pressures will be limited 5 because of where know we can induce a fracture in the 6 injection zone rock. And it should be around 360 or 7 sixty-five pounds, would be an operating pressure that 8 the well will be limited to.</p> <p>9 MR. CLAWSON: Now, I'd refer you to Exhibits 10 No. 12 and 13. Are you familiar with these exhibits?</p> <p>11 MR. ALLIN: Yes.</p> <p>12 MR. CLAWSON: Would you please tell us what they 13 are?</p> <p>14 MR. ALLIN: Exhibit 12 is the report from BJ 15 Services, which was the contractor used to perform 16 step-rate injection testing and internal mechanical 17 integrity testing of the well. And this is a requirement 18 of the rules that it has to be configured, as it will be 19 for injection, with a tubing string in place, a packer, 20 and the injection zones all set up. And so the well is 21 configured the way it will be -- it was at this date. 22 And this is back in July, I think. Yeah, July 17 -- or I 23 made notes on it on the 17th.</p> <p>24 What this shows, the first page just is a report 25 of rates of pumping. I've made some notes on it. They</p> <p style="text-align: right;">Page 145</p>

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<p>1 also established the frac gradient, which is stated.</p> <p>2 Then the second page of the exhibit is a chart</p> <p>3 of the pumping rate. What it does, it takes all of the</p> <p>4 numbers from the spreadsheet on the first page and put</p> <p>5 them in a graphical form. This is a real graph that's</p> <p>6 produced by transducers on the tubing string and on the</p> <p>7 contractors' pump as they're pumping.</p> <p>8 And what you see here is time along the lower</p> <p>9 axis, and pressure on the Y axis. And then rates are</p> <p>10 noted as the pump is brought from a barrel per minute to</p> <p>11 a barrel-and-a-half per minute, two barrels, on up,</p> <p>12 stepping bigger and bigger steps. But each step held</p> <p>13 even at a pump rate. And then pressure is measured at</p> <p>14 those pump rates.</p> <p>15 And what this tended to show is: You can see,</p> <p>16 as they got to about seven barrels per minute and a</p> <p>17 pressure built at a little over 400 pounds, that there's</p> <p>18 a spike in the pressure reading. It spiked up to 425,</p> <p>19 then dropped back to 400 and started building again as</p> <p>20 they were pumping at seven barrels a minute. Then</p> <p>21 there's various steps above that at nine barrels a minute</p> <p>22 and 11 barrels per minute.</p> <p>23 Once that's analyzed, you can -- well, I should</p> <p>24 say one other thing: Then they stop pumping, and so we</p> <p>25 know we've induced a fracture there because of that break</p> <p style="text-align: right;">Page 146</p>	<p>1 MR. ALLIN: Exhibit 13 is a report that was</p> <p>2 submitted by a petroleum engineer from Colorado named</p> <p>3 David Dillon. He was engaged by a party that was</p> <p>4 considering an investment in the project and wanted it</p> <p>5 evaluated by a third party. And Mr. Dillon, who I think</p> <p>6 is formerly a Colorado state petroleum engineer at one</p> <p>7 point in his career, just went through the general rules</p> <p>8 that he knows of from UIC regulations, from the</p> <p>9 permitting type regulations; evaluated the report, for</p> <p>10 instance, that we just saw of the step-rate injection</p> <p>11 testing, also just the configuration of the well; he</p> <p>12 examined the logs; he created a little diagram on the</p> <p>13 fourth page of his report of the configuration of the</p> <p>14 well, the way it's set up, and the way it was tested.</p> <p>15 And his general conclusions are a very good, short</p> <p>16 synopsis that the Board can use to kind of familiarize</p> <p>17 themselves with the attributes of this well and how it</p> <p>18 should qualify for conversion to injection. And this is</p> <p>19 a letter that just synthesizes all of those attributes.</p> <p>20 MR. CLAWSON: So the general purpose of</p> <p>21 submitting Exhibit No. 13 is just simply to give the</p> <p>22 Board a narrative explanation on the UIC, the Harley Dome</p> <p>23 No. 1 well, and the injection project?</p> <p>24 MR. ALLIN: Yes, that's right. I think it's</p> <p>25 simpler than going through the entire file the Division</p> <p style="text-align: right;">Page 148</p>
<p>1 point at 400 psi. And so then when they stop pumping,</p> <p>2 there's a point at which any induced fracture is known to</p> <p>3 close. And that's called a shutdown pressure. And that</p> <p>4 was at 250 psi. Those are two key pressures to notice</p> <p>5 from any one of these pumping tests.</p> <p>6 Then those are graphed out on the third page of</p> <p>7 that exhibit. And they're looking at the trends of the</p> <p>8 rate versus pressure. And once a break point or a</p> <p>9 fracture is induced in the formation, what happens is, as</p> <p>10 the rate of pumping increases, the pressure doesn't</p> <p>11 increase along with it in locked step. And that means a</p> <p>12 fracture is being created and fluid is running out ahead</p> <p>13 through the porosity of the rock faster than what it can</p> <p>14 normally take it without breaking.</p> <p>15 And so what this chart shows is at basically</p> <p>16 almost six barrels a minute, there is a breakover point</p> <p>17 in the behavior of the curves at 400 psi. So that, we</p> <p>18 know, indicates a top perforation depth of about</p> <p>19 1344 feet, knowing -- whatever the formation pressure is</p> <p>20 there -- that when you add whatever column of fluid it is</p> <p>21 in the well, the surface pressure cannot exceed 400, or</p> <p>22 we'll reasonably assume to be fracturing the target</p> <p>23 formation through the perms.</p> <p>24 MR. CLAWSON: Would you please just briefly</p> <p>25 address Exhibit 13? What is this exhibit?</p> <p style="text-align: right;">Page 147</p>	<p>1 has.</p> <p>2 MR. CLAWSON: Will the Wingate Sandstone handle</p> <p>3 the proposed injection pressures without causing</p> <p>4 fractures?</p> <p>5 MR. ALLIN: Yes. There will be -- the Division</p> <p>6 will make -- the staff will make a determination, based</p> <p>7 upon the step-rate injection testing, of what the maximum</p> <p>8 allowable injection pressure will be as part of the</p> <p>9 process of issuing the permit. As long as that limit,</p> <p>10 which will be under 400 psi surface operating pressure,</p> <p>11 as long as that is not exceeded, there will be no</p> <p>12 possibility of inducing fractures, which may allow fluid</p> <p>13 to migrate out of the proposed injection zone.</p> <p>14 MR. CLAWSON: Is the Wingate Sandstone competent</p> <p>15 to contain the injected fluids and prevent migration to</p> <p>16 any underground source of drinking water?</p> <p>17 MR. ALLIN: Yes, it is, in combination with the</p> <p>18 confining layers below and above it, yes.</p> <p>19 MR. CLAWSON: Do you expect that the formation</p> <p>20 will remain competent under the injection operations?</p> <p>21 MR. ALLIN: Yes.</p> <p>22 MR. CLAWSON: Will the proposed injection</p> <p>23 operations initiate fractures in the overlying rocks that</p> <p>24 will allow the injected fluids, or even the formation</p> <p>25 fluids, to enter a fresh-water aquifer and an underground</p> <p style="text-align: right;">Page 149</p>

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<p>1 source of drinking water?</p> <p>2 MR. ALLIN: No, that will be impossible.</p> <p>3 And from the standpoint of the way the well is</p> <p>4 configured where the perforations are, where the</p> <p>5 confining layers are, and the operational requirements of</p> <p>6 where the packer is set, that will eliminate any</p> <p>7 possibility of mixing these waters.</p> <p>8 There's just one other item I wanted to bring up</p> <p>9 about water quality. The brine in the proposed injection</p> <p>10 zone in the Wingate of 55,000 ppm also has unique</p> <p>11 chemistry from the superjacent Entrada Formation, which</p> <p>12 had about a 35,000 ppm brine. Those brines are</p> <p>13 chemically distinct. And so in their natural state, it</p> <p>14 proves that the Kayenta confining layer that intervenes</p> <p>15 between those two porous formations is competent because</p> <p>16 that water is never mixed.</p> <p>17 MR. CLAWSON: Are there any wells within a</p> <p>18 half-mile radius of the Harley Dome No. 1 well that could</p> <p>19 provide a conduit that would allow fluids to migrate up</p> <p>20 or down a wellbore and enter improper intervals, such as</p> <p>21 a fresh water aquifer?</p> <p>22 MR. ALLIN: No. There are two wells, but they</p> <p>23 were not drilled deeply enough to intersect the proposed</p> <p>24 injection zone. And those wells are also plugged</p> <p>25 properly.</p> <p style="text-align: right;">Page 150</p>	<p>1 MR. CLAWSON: In your opinion, is there any</p> <p>2 chance of contamination of a drinking water source that</p> <p>3 could be caused by the injection -- proposed injection</p> <p>4 operations?</p> <p>5 MR. ALLIN: No.</p> <p>6 MR. CLAWSON: Okay. Now I'd like to address the</p> <p>7 letter that was dated December 7 that was filed by Living</p> <p>8 Rivers earlier today very briefly. In that regard,</p> <p>9 however, I'd like you to refer to Rebuttal Exhibits No. 2</p> <p>10 and No. 3, which are part of the package that we</p> <p>11 submitted earlier today. You may want to refer to those</p> <p>12 in answering these additional questions.</p> <p>13 Referring to the second full paragraph on page 1</p> <p>14 of the December 7 letter, Living Rivers asserts that</p> <p>15 "Westwater has entered an existing well."</p> <p>16 Was the Harley Dome well drilled specifically</p> <p>17 for purposes of this project?</p> <p>18 MR. ALLIN: Yes, it was.</p> <p>19 MR. CLAWSON: Was it an existing well?</p> <p>20 MR. ALLIN: No, it was not.</p> <p>21 MR. CLAWSON: On the second paragraph beginning</p> <p>22 on -- or the third paragraph beginning on page 1 of the</p> <p>23 letter, Living Rivers makes certain factual assertions</p> <p>24 about the Entrada Sandstone.</p> <p>25 Is Westwater going to inject water into the</p> <p style="text-align: right;">Page 152</p>
<p>1 MR. CLAWSON: Is Wingate Sandstone an</p> <p>2 underground source of drinking water?</p> <p>3 MR. ALLIN: No, it is not.</p> <p>4 MR. CLAWSON: Are there any domestic water wells</p> <p>5 within the area of the Harley Dome No. 1 water well?</p> <p>6 MR. ALLIN: My scan included the Townships 18</p> <p>7 South 24 and 24 East, and 19 South 24 and 25 East.</p> <p>8 There's no water wells of any kind in those townships.</p> <p>9 MR. CLAWSON: In your opinion as an expert, will</p> <p>10 there be any communication of the injected fluids with</p> <p>11 potential sources of underground drinking water in</p> <p>12 aquifers above the Wingate Sandstone due to the proposed</p> <p>13 injection program?</p> <p>14 MR. ALLIN: No.</p> <p>15 MR. CLAWSON: Will there be any communication</p> <p>16 with any surface sources of drinking water, such as the</p> <p>17 Colorado River?</p> <p>18 MR. ALLIN: No.</p> <p>19 MR. CLAWSON: How can you be certain in either</p> <p>20 case?</p> <p>21 MR. ALLIN: The way the well is configured, the</p> <p>22 regional geology formation pressures. There's a number</p> <p>23 of elements that, all combined, convince me that it will</p> <p>24 be impossible to do either one of the two items, either</p> <p>25 pollute USDWs or surface drinking water supplies.</p> <p style="text-align: right;">Page 151</p>	<p>1 Entrada Sandstone?</p> <p>2 MR. ALLIN: No, it will not. It's not proposed.</p> <p>3 MR. CLAWSON: So the Entrada Sandstone is not</p> <p>4 the subject reservoir?</p> <p>5 MR. ALLIN: No, it is not.</p> <p>6 MR. CLAWSON: On the first full paragraph on</p> <p>7 page No. 2, Living Rivers makes assertions about a</p> <p>8 pressure head that may propagate toward the River Canyon.</p> <p>9 You've already briefly discussed this.</p> <p>10 But would you please explain to the Board why</p> <p>11 you do not think that the water that's injected into the</p> <p>12 Harley Dome No. 1 well will ever reach the Colorado</p> <p>13 River?</p> <p>14 MR. ALLIN: It has to do with two elements.</p> <p>15 There's vertical separation, and there's lateral</p> <p>16 separation. The lateral separation, of course, is</p> <p>17 5.8 miles; the vertical separation is 800 feet. Even</p> <p>18 taking into account a static fluid level in the well,</p> <p>19 there is still not going to be a way to build formation</p> <p>20 pressure in a zone with this high level of</p> <p>21 transmissivity, permeability, and porosity.</p> <p>22 In order to begin to build enough pressure, I'm</p> <p>23 not sure I could imagine enough volume of water or</p> <p>24 pumping rates that would allow building pressure in a</p> <p>25 highly subnormally pressured reservoir like the Wingate</p> <p style="text-align: right;">Page 153</p>

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<p>1 brine aquifer at Harley Dome.</p> <p>2 MR. CLAWSON: Now I'd refer you to the item</p> <p>3 Labeled G, which on the third page of the letter. Living</p> <p>4 Rivers -- in the last paragraph on page 3, Living Rivers</p> <p>5 is referring to a pressurized aquifer.</p> <p>6 Will the injection operation -- injection</p> <p>7 operations in the Harley Dome well create a pressurized</p> <p>8 aquifer?</p> <p>9 MR. ALLIN: Will it what?</p> <p>10 MR. CLAWSON: Create a pressurized -- well first</p> <p>11 of all, do you understand what a "pressurized aquifer"</p> <p>12 might be?</p> <p>13 MR. ALLIN: Not exactly. In essence, my</p> <p>14 previous point was: We know what the formation pressure</p> <p>15 is in the Wingate Sandstone. I'm just not sure how it's</p> <p>16 going to be possible to materially increase that pressure</p> <p>17 and build a wall of water uphill in a tilted formation.</p> <p>18 MR. CLAWSON: I'd like you to refer to rebuttal</p> <p>19 Exhibit, I guess it would be No. 3. Are you familiar</p> <p>20 with this exhibit?</p> <p>21 MR. ALLIN: Yes.</p> <p>22 MR. CLAWSON: Could you please explain to the</p> <p>23 Board the cross section at the top of that exhibit.</p> <p>24 MR. ALLIN: The cross section at the top of the</p> <p>25 exhibit, which is illustrated in the lower part of the</p> <p style="text-align: right;">Page 154</p>	<p>1 cross section.</p> <p>2 The top of that injection zone, a horizontal</p> <p>3 line is drawn under the area of the river. It comes out</p> <p>4 to be 800 feet below the river surface, and of course,</p> <p>5 laterally adjacent to all of the granite that's</p> <p>6 underneath there. The upper part of the Wingate</p> <p>7 Sandstone, of course, is on outcrop near and above the</p> <p>8 river where it's filled with air.</p> <p>9 Basically, that's the other thing this shows, is</p> <p>10 the upper line shows that within the Wingate, since we</p> <p>11 know that the static fluid level is about 600 feet from</p> <p>12 surface, if that's projected over towards near the river,</p> <p>13 that there are several miles of Wingate Formation over</p> <p>14 there that have to be filled with air. Because if the</p> <p>15 static fluid level is 600 feet from the surface, or at an</p> <p>16 elevation of about 4500 feet, any of the rock appearing</p> <p>17 above that in the cliffs above the river is going to be</p> <p>18 air filled.</p> <p>19 And so if it were possible to pump enough water</p> <p>20 into the well to start crossing updip equal elevation</p> <p>21 lines or structural contour lines, if it's possible to do</p> <p>22 that, the outcrops are, first of all, going to experience</p> <p>23 expulsion of air that's in the pore space. After that,</p> <p>24 it's going to be unconfined fresh water that's in some of</p> <p>25 the pore space. And so this is the reason why monitoring</p> <p style="text-align: right;">Page 156</p>
<p>1 figure, which is another geological map at a scale of</p> <p>2 about a quarter inch to the mile, it provides similar</p> <p>3 information as previous exhibits on a slightly different</p> <p>4 scale. It shows a little more of the Colorado River. It</p> <p>5 shows more of the outcrop belt as the formations wrap</p> <p>6 around the northwesterly plunge of the Uncompahgre</p> <p>7 Uplift.</p> <p>8 But taking a published cross section, which is</p> <p>9 on an analogous trend to where the two areas in</p> <p>10 question -- with Living Rivers and their concern about</p> <p>11 the Westwater Canyon area stretch of the river and the</p> <p>12 Harley Dome injection well site, this profile, although</p> <p>13 it actually is drawn through lower Westwater -- the</p> <p>14 middle of Westwater Canyon, the same type of thing</p> <p>15 applies to the relative spot between Westwater Ranger</p> <p>16 Station and the Harley Dome site.</p> <p>17 So what this shows is the general tilt of the</p> <p>18 formations on an even scale one-to-one. And the fact</p> <p>19 that the top of the formation in the HD-1 well, where</p> <p>20 it's labeled in the upper right on the A-to-A prime cross</p> <p>21 section, it says "HD-1 Relative Position." Then it shows</p> <p>22 two dotted lines that are horizontal lines, two dashed</p> <p>23 lines. The lower one is drawn from the intersection of</p> <p>24 the wellbore and the top of the Wingate Formation, which</p> <p>25 is painted on here in kind of a light blue color on this</p> <p style="text-align: right;">Page 155</p>	<p>1 seeps is important.</p> <p>2 First of all, you won't see much of anything</p> <p>3 because it will just be air, if you could even induce a</p> <p>4 wall of water to go uphill towards the river. Second of</p> <p>5 all, you are going to start expelling fresh water first,</p> <p>6 which is going to be visible on the outcrops. And it</p> <p>7 would be many, many years, and possibly centuries, before</p> <p>8 injectate would ever reach the 5.8 miles.</p> <p>9 And that's -- and so this cross section just</p> <p>10 tries to put a little more of a -- an easier-to-evaluate</p> <p>11 picture of how these two areas are related. And this</p> <p>12 figure, also, I made a little more effort to add more</p> <p>13 detail on the elevation of the river, the elevation of</p> <p>14 more contour lines in feet. And so it's just got a</p> <p>15 little more data on it. They all basically support the</p> <p>16 same type of conclusions.</p> <p>17 MR. CLAWSON: Moving to page 4 of the letter.</p> <p>18 In the first full paragraph, it mentions, "Sandstones</p> <p>19 with high transmissivity, which occur above the Westwater</p> <p>20 Ranger Station."</p> <p>21 Is the only sandstone that we're dealing with</p> <p>22 here the Wingate Sandstone?</p> <p>23 MR. ALLIN: For an injection zone, yes.</p> <p>24 MR. CLAWSON: And we know where it -- it</p> <p>25 outcrops in, actually, Ruby Canyon, upstream of Westwater</p> <p style="text-align: right;">Page 157</p>

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<p>1 Ranger Station, right?</p> <p>2 MR. ALLIN: Yes, that's right. And it's been</p> <p>3 accurately mapped on multiple scales, which I've used in</p> <p>4 figures.</p> <p>5 MR. CLAWSON: And then have you looked for seeps</p> <p>6 on those outcrops of the Wingate Sandstone and Ruby</p> <p>7 Canyon?</p> <p>8 MR. ALLIN: Yes, I have.</p> <p>9 MR. CLAWSON: Did you find any?</p> <p>10 MR. ALLIN: No.</p> <p>11 MR. CLAWSON: You just testified that were water</p> <p>12 to reach the Wingate Sandstone, you know, outcrop of the</p> <p>13 Colorado, the first thing you'd see would be fresh water.</p> <p>14 Do you see any purpose, any useful purpose, of a</p> <p>15 monitor well to monitor the flow of the water?</p> <p>16 MR. ALLIN: No.</p> <p>17 MR. CLAWSON: And why is that?</p> <p>18 MR. ALLIN: The outcrop examination is going to</p> <p>19 give similar information. It just -- I think it's</p> <p>20 redundant.</p> <p>21 MR. CLAWSON: And do you see any purpose in a</p> <p>22 monitor well for monitoring gas that may migrate -- be</p> <p>23 generated at the Harley Dome well and then migrate?</p> <p>24 MR. ALLIN: No, because the type of gas that is</p> <p>25 a potential problem to be generated in a well like this,</p> <p style="text-align: right;">Page 158</p>	<p>1 CHAIRMAN JOHNSON: Ms. Lewis, any objections?</p> <p>2 MS. LEWIS: No objections from the Division.</p> <p>3 CHAIRMAN JOHNSON: Mr. Shea?</p> <p>4 MR. SHEA: No objection.</p> <p>5 CHAIRMAN JOHNSON: Board?</p> <p>6 Okay. So those exhibits are entered.</p> <p>7 MR. CLAWSON: Thank you. That's the end of my</p> <p>8 questions for this witness.</p> <p>9 CHAIRMAN JOHNSON: Thank you, Mr. Clawson.</p> <p>10 Let's take about a ten-minute break before we continue</p> <p>11 with your questions, Ms. Lewis. So let's say about 3:30</p> <p>12 let's reconvene.</p> <p>13 (A break was taken from 3:17 p.m. to 3:32 p.m.)</p> <p>14 CHAIRMAN JOHNSON: Okay. Let's resume. Okay.</p> <p>15 Ms. Lewis, let's go ahead with you.</p> <p>16 MS. LEWIS: The Division has no questions for</p> <p>17 Mr. Allin.</p> <p>18 CHAIRMAN JOHNSON: That was easy.</p> <p>19 Mr. Shea.</p> <p>20 MR. SHEA: First, I do want to thank the Board</p> <p>21 for taking the time, which obviously has been much longer</p> <p>22 than I expected, or certainly I'm assuming the Board did,</p> <p>23 as well. I'll try to confine my questions to five areas.</p> <p>24 CROSS-EXAMINATION</p> <p>25 BY MR. SHEA:</p> <p style="text-align: right;">Page 160</p>
<p>1 it's created by assemblages of bacteria that normally</p> <p>2 feed on hydrocarbons and produce hydrogen sulfide gas.</p> <p>3 And if that is occurring, the way that it can be</p> <p>4 monitored very easily is that at every cessation of</p> <p>5 pumping at the injection well, or just when it's sitting</p> <p>6 idle for whatever reason, H2S can be measured with highly</p> <p>7 sensitive sensors. It's something that's a common</p> <p>8 measurement that's made around well sites because people</p> <p>9 are concerned because it's a poisonous gas. And so it's</p> <p>10 very easy to recognize tiny concentrations. And the</p> <p>11 cause of that gas, since it's known to be sulfate</p> <p>12 producing bacteria, or SRBs, they can be killed with</p> <p>13 treatments of, basically, bleach -- with biocides.</p> <p>14 MR. CLAWSON: Okay. That's the end of my</p> <p>15 questions for this witness.</p> <p>16 As a bookkeeping matter, I'd like you to refer</p> <p>17 to Exhibits 7 through 10, 12 and 13, and Rebuttal Exhibit</p> <p>18 No. 3. I'm not going to ask for No. 2, just No. 3.</p> <p>19 Were these prepared by you or by Westwater in</p> <p>20 connection with this proceeding or in the regular course</p> <p>21 of Westwater's business activities, or are they a part of</p> <p>22 the public record in this proceeding?</p> <p>23 MR. ALLIN: Yes.</p> <p>24 MR. CLAWSON: I'd ask that Exhibits 7 through</p> <p>25 10, 12, 13, and Rebuttal Exhibit No. 3 be admitted.</p> <p style="text-align: right;">Page 159</p>	<p>1 MR. SHEA: The first, just as a technical</p> <p>2 question, the geology and hydrology, if the transmittity</p> <p>3 (sic) in the Wingate Formation is 22 percent, would that</p> <p>4 mean that the flow of the water found there would be 15</p> <p>5 or 20 feet per day, Mr. Allin?</p> <p>6 MR. GILL: Just a point of clarification. Could</p> <p>7 you reference a point in the statute or the regulations</p> <p>8 or the application where that would be an issue?</p> <p>9 MR. SHEA: Well, that goes to a question I was</p> <p>10 also going to ask, and that is we keep going back to the</p> <p>11 drinking water question. And I would include the</p> <p>12 Colorado River under that jurisdictional question. If</p> <p>13 that's not something that the Board is accepting, then I</p> <p>14 simply want it noted in the record.</p> <p>15 But my review is that a lot of time has been</p> <p>16 spent, properly, in the process up to today's hearing</p> <p>17 looking at the Moab public drinking water. But I'm also</p> <p>18 looking at the Colorado River to meet the regulatory</p> <p>19 requirements of the EPA as a source of public drinking</p> <p>20 water. And if the Board disagrees with that -- I</p> <p>21 understand why you might -- I just want it noted that</p> <p>22 that's the disagreement between --</p> <p>23 MR. GILL: And I'm not challenging you. It's</p> <p>24 just compartmentalizing it.</p> <p>25 MR. SHEA: I understand.</p> <p style="text-align: right;">Page 161</p>

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<p>1 MR. GILL: You can say, "What I'm talking about</p> <p>2 on the next line of questions is going to this provision</p> <p>3 of the regulations or the statute or the application</p> <p>4 where I want -- I'm going to show that you are either</p> <p>5 violating that or you haven't complied with it." I think</p> <p>6 that's kind of where I'm coming from. That would help</p> <p>7 me.</p> <p>8 MR. SHEA: Yeah, I understand. I think it's</p> <p>9 difficult for me to make a prediction about a violation.</p> <p>10 What I am trying to do is ask the questions that</p> <p>11 then the Board could conclude there is a likelihood that</p> <p>12 there would be a violation. And that may be a</p> <p>13 distinction, from your perspective, without a difference.</p> <p>14 But what I'm trying to do by asking the hydrology/geology</p> <p>15 question is: Is there a chance -- and the Board has to</p> <p>16 decide what level that chance would be acceptable at --</p> <p>17 that the injected water would permeate the Colorado</p> <p>18 River? And, you know, if your immediate answer is, "No,</p> <p>19 there is no chance of that," then we obviously have a</p> <p>20 disagreement.</p> <p>21 But I am also trying to put down in the record</p> <p>22 the understanding that their expert has on the geology</p> <p>23 and hydrology.</p> <p>24 And I think -- now, again, we haven't taken up</p> <p>25 the bulk of the day. That's been by the proponents of</p> <p style="text-align: right;">Page 162</p>	<p>1 anticline there. And I want to know why that anticline</p> <p>2 might not be an anomaly where some of this water could</p> <p>3 easily flow in unpredicted ways. So that's on the</p> <p>4 geology/hydrology side.</p> <p>5 MR. GILL: That helps me a lot.</p> <p>6 CHAIRMAN JOHNSON: Go ahead, Mr. Shea. I think</p> <p>7 your question had to do with transmissivity.</p> <p>8 MR. SHEA: Yes. And the rate, given your</p> <p>9 testimony, that it was 22 percent in Wingate. By my</p> <p>10 calculations, that's 15 or 20 feet per day.</p> <p>11 MR. ALLIN: There seems to be a</p> <p>12 misunderstanding, because I didn't bring up, in my</p> <p>13 testimony, transmissivity at all. I stated 22 percent</p> <p>14 porosity from density logging.</p> <p>15 MR. SHEA: So what would that translate into --</p> <p>16 if you could make that calculation -- into</p> <p>17 transmissivity?</p> <p>18 MR. ALLIN: It would have been tested on core.</p> <p>19 MR. SHEA: So we don't know what the flow rate</p> <p>20 would be in the Wingate Formation?</p> <p>21 MR. ALLIN: No. I have done some -- looked at</p> <p>22 some published information on the Wingate that's not</p> <p>23 local. Transmissivities there were low. But the rate of</p> <p>24 advance of fluid through a sandstone that's 337 feet</p> <p>25 thick, whether transmissivity is high or low, it's on the</p> <p style="text-align: right;">Page 164</p>
<p>1 the permit. So I would ask the Board to just let us</p> <p>2 explore these areas and see, because it does go to the</p> <p>3 drinking water question. But as I said, if you view the</p> <p>4 Colorado River as a nondrinking water source, then that's</p> <p>5 a different question.</p> <p>6 MR. JENSEN: It seems to me that -- didn't he</p> <p>7 answer the question relative to getting into the</p> <p>8 Colorado, and so your question would be, "Well, what are</p> <p>9 the odds?"</p> <p>10 MR. SHEA: Not necessarily what are the odds,</p> <p>11 but what are the mechanics? There are two questions</p> <p>12 here. One is the rate at which the water that's coming</p> <p>13 in. The question earlier was that that particular strata</p> <p>14 was already filled with water. And the comment, by</p> <p>15 metaphor, was that, Well, it would just spill over.</p> <p>16 Well, I think is Board is entitled to know where it's</p> <p>17 going to spill over and at what rate it would spill over.</p> <p>18 There's also testimony that above the area where</p> <p>19 the UIC well has been drilled is filled with air in this</p> <p>20 particular strata. And water has less volume -- or</p> <p>21 excuse me, water has more volume than air. So I was</p> <p>22 wondering why the statement was made that if there is</p> <p>23 some leakage up, why there would first be fresh water as</p> <p>24 opposed to air, which is far more difficult to ascertain.</p> <p>25 And then the final area is that there is</p> <p style="text-align: right;">Page 163</p>	<p>1 order of centimeters per year.</p> <p>2 MR. SHEA: This goes to the question a Board</p> <p>3 member asked you; and that is, your testimony, I believe,</p> <p>4 was that this particular segment was -- you found water</p> <p>5 there with salt, correct?</p> <p>6 MR. ALLIN: Yes, that's right.</p> <p>7 MR. SHEA: So where does the water go when you</p> <p>8 inject upwards to the limits that we've been talking</p> <p>9 about, which I think were 60,000 barrels, or eight to</p> <p>10 nine-acre feet, you know, at maximum production?</p> <p>11 MR. ALLIN: And so I guess the question you are</p> <p>12 asking is: What direction does the water move? Is that</p> <p>13 right?</p> <p>14 MR. SHEA: No. I know the direction from your</p> <p>15 testimony. But it seems to be important, given some</p> <p>16 anomalies there -- the anticline being an example -- to</p> <p>17 get an answer from you. You've mentioned this idea of a</p> <p>18 spillover, that water, if it came in by injection would</p> <p>19 simply spill over. And I need to know where it spills</p> <p>20 over to.</p> <p>21 MR. ALLIN: It simply moves in a radial</p> <p>22 direction through the formation to points of lower</p> <p>23 pressure. The identifying points of lower pressure are</p> <p>24 downdip from the well. So it's just across structural</p> <p>25 contour lines. In this case, it's down the axis of the</p> <p style="text-align: right;">Page 165</p>

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<p>1 Bryson Wash syncline.</p> <p>2 MR. SHEA: And how do we know that there's a</p> <p>3 lower pressure there without having drilled a well to</p> <p>4 understand what the pressure was downstream or down the</p> <p>5 incline?</p> <p>6 MR. ALLIN: It was covered in -- I had mentioned</p> <p>7 a study that's not part of these exhibits that I did on</p> <p>8 the Entrada Sandstone, which is an analogous aquifer,</p> <p>9 where you have an identified recharge point in the</p> <p>10 Uncompahgre Uplift and the Colorado River, which, as a</p> <p>11 whole, infuses fresh water into these porous formations.</p> <p>12 It loads up and moves to areas of lower hydraulic head,</p> <p>13 which are identified to be northward.</p> <p>14 MR. SHEA: So you are asking the Board, by</p> <p>15 analogy of another formation, to say this would be</p> <p>16 similar?</p> <p>17 MR. ALLIN: Yes. These formations are separated</p> <p>18 by about 150 feet of rock.</p> <p>19 MR. SHEA: Okay.</p> <p>20 MR. CLAWSON: Pat, can I have you clarify a</p> <p>21 point? You said they are going to inject 65,000 barrels.</p> <p>22 Was that an annual rate or something?</p> <p>23 MR. SHEA: I thought you --</p> <p>24 MR. JENSEN: The testimony is 6500.</p> <p>25 MR. SHEA: 6500, excuse me.</p> <p style="text-align: right;">Page 166</p>	<p>1 at the BLM's correlative rights -- the reservoir pressure</p> <p>2 there in the Entrada is 185 pounds. So the entire -- the</p> <p>3 entire resource of gas, including methane and -- it's</p> <p>4 mainly nitrogen -- is really a small number.</p> <p>5 MR. SHEA: But it's still commercially viable?</p> <p>6 MR. ALLIN: There's no proof of that.</p> <p>7 MR. SHEA: Okay. Let me move on to a question</p> <p>8 of the determination on the graph, which I believe was</p> <p>9 your exhibit where you showed the cross sections. And it</p> <p>10 relates to 360 pound pressure psi.</p> <p>11 Why is 360 a safe number as opposed to 320 as</p> <p>12 opposed to 260?</p> <p>13 MR. CLAWSON: I'm sorry, Pat, which exhibit are</p> <p>14 you referring to?</p> <p>15 MR. SHEA: Let me find it here. It's</p> <p>16 Exhibit 12, page 2. The previous page. You just went</p> <p>17 past it.</p> <p>18 And you were pointing out that at seven barrels</p> <p>19 per minute a fracture occurred. So the line of 400 psi</p> <p>20 was dotted across there.</p> <p>21 And my question, from a safety point of view, or</p> <p>22 from, you know, migrating water to unknown areas, what's</p> <p>23 the rationale of keeping it at 360 with some greater</p> <p>24 margin than 40 pounds per square inch than at 360?</p> <p>25 MR. ALLIN: Well, I'm not the -- as the permit</p> <p style="text-align: right;">Page 168</p>
<p>1 MR. CLAWSON: Then you used an acre foot. And I</p> <p>2 wondered if you had made an annual --</p> <p>3 MR. SHEA: Yeah, I miscalculated.</p> <p>4 MR. CLAWSON: So it's 6500.</p> <p>5 MR. SHEA: We did have a number of 16,000 at one</p> <p>6 point. That's not your testimony.</p> <p>7 So 6500 per day would be the highest rate you</p> <p>8 could go at?</p> <p>9 MS. LEWIS: Can I make a comment? Are you,</p> <p>10 perhaps, referring to the maximum production of the</p> <p>11 facility that they were hoping to do?</p> <p>12 MR. SHEA: Yes. Thank you.</p> <p>13 Does that clarify?</p> <p>14 MR. CLAWSON: Thank you, yeah.</p> <p>15 MR. SHEA: Let me also, Mr. Allin, when you</p> <p>16 heard Mr. Clawson, I believe, characterize it as just</p> <p>17 two percent helium in the area that is known as the</p> <p>18 Harley Dome, is that considered a rich or poor helium</p> <p>19 deposit?</p> <p>20 MR. ALLIN: Two percent is probably relatively</p> <p>21 rich.</p> <p>22 MR. SHEA: Yes. So there would be some</p> <p>23 significant value in the helium?</p> <p>24 MR. ALLIN: Some value. But the reservoir</p> <p>25 pressure -- because I had to study that in order to look</p> <p style="text-align: right;">Page 167</p>	<p>1 applicant here, it's not my purview to set that limit.</p> <p>2 The regulatory agency here, the DOGM, normally will</p> <p>3 select this, based upon a proven frac gradient, a frac</p> <p>4 point here. This pressure of 400 psi, they will set a</p> <p>5 limit by permit on giving this a little head room. Like</p> <p>6 15 to 20 percent would be normally how you would set a</p> <p>7 permit.</p> <p>8 MR. SHEA: So is your testimony that it's the</p> <p>9 staff of the Division of Oil, Gas and Mining that has</p> <p>10 suggested 360?</p> <p>11 MR. ALLIN: No. They haven't made a suggestion</p> <p>12 yet. They will select a number, based upon knowing that</p> <p>13 a fracture can be induced in this formation at</p> <p>14 400 pounds.</p> <p>15 MR. SHEA: And this, with Mr. Clawson's</p> <p>16 permission, is perhaps where Dr. Stewart could answer the</p> <p>17 question of how the 360 was determined.</p> <p>18 MR. STEWART: I didn't determine it. It was</p> <p>19 based off of what David Allin has provided. And in his</p> <p>20 report, we came up with 3 1/2 barrels a day, which</p> <p>21 calculates to the 6500 barrels -- 3 1/2 barrels a minute</p> <p>22 calculates up to the 6500 barrels a day.</p> <p>23 MR. SHEA: Just so the Board understands, I</p> <p>24 think everyone agrees that a fracture is an undesirable</p> <p>25 result of pumping the injection well. And I think it's</p> <p style="text-align: right;">Page 169</p>

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<p>1 important to understand what the formula was in 2 determining the amount of barrels per minute as being 3 pumped into the injection wells.</p> <p>4 MR. STEWART: Let me clarify my response. My 5 response is that the pressure will be set, and whatever 6 the pumping rate that accepts that is the pumping rate. 7 We're not saying that it's going to be 6500 barrels a 8 day. We're saying that's going to be at a certain 9 pressure. And whatever the formation accepts at that 10 pressure is what it will be.</p> <p>11 MR. SHEA: Maybe Ms. Lewis can --</p> <p>12 MS. LEWIS: If it pleases the Board, the 13 Division would like to clarify how they came upon their 14 number for psi.</p> <p>15 MR. HILL: Typically, the Division will back off 16 ten percent of the breakover pressures indicated from 17 that step-rate test. And as far as our permits go, 18 typically we do not, although we could, establish maximum 19 volumes. We usually just, on our permits, use a maximum 20 injection pressure. And we just monitor the wells.</p> <p>21 We do track volumes going into the wells. But 22 when we are monitoring them and inspecting them, we're 23 just monitoring the pressure.</p> <p>24 MR. JENSEN: And if you look at Exhibit 13 on 25 page 3, the second paragraph, there's a pretty good</p> <p style="text-align: right;">Page 170</p>	<p>1 age of the internet that you couldn't get that on a daily 2 basis just so that you could monitor?</p> <p>3 MR. HILL: I guess it's possible. We have not 4 gone there with our monitoring.</p> <p>5 MR. SHEA: It does, again, seem to be 6 technologically, and rather inexpensively, able to do 7 that. But --</p> <p>8 MR. HAROUNY: Mr. Shea, as you know, production 9 is reported on a monthly basis, as you know.</p> <p>10 MR. SHEA: I understand that. And I simply 11 would point out that that's based on historic means of 12 communication. And in 2010, that means of communication 13 is expedited. And I'm just saying that it might be 14 worthwhile for the Board to consider this as one of those 15 conditions.</p> <p>16 CHAIRMAN JOHNSON: Mr. Shea, your recommendation 17 for the permit or the approvals is noted. So let's move 18 ahead.</p> <p>19 MR. SHEA: Okay. Let me raise the question of 20 the anticline.</p> <p>21 Mr. Allin, explain to me, if you would, why that 22 Bitter Root -- Bitter Creek anticline wouldn't be a place 23 where some of this spillage that we've talked about might 24 not find its way.</p> <p>25 MR. GILL: State your question again, please, if</p> <p style="text-align: right;">Page 172</p>
<p>1 summary there of this -- David Dillon is talking about 2 and gets at kind of how they got to using the -- they 3 used 330 pounds by backing off roughly the ten percent 4 and got 6480 barrels. So that's how I kind of interpret 5 what you are talking about.</p> <p>6 MR. HILL: Right. If the formation pressure's 7 up, we won't let them put one barrel a day down there.</p> <p>8 MR. JENSEN: Correct.</p> <p>9 MR. SHEA: And just for my edification, how 10 often will the pressure be taken by the Division? By 11 monthly reports, or --</p> <p>12 MR. HILL: We do get monthly reports. And we 13 don't have a set time schedule for on-site inspections. 14 It's when we have somebody in the area, we have them 15 check them. If there hasn't been anybody in the area for 16 a while, we'll send somebody out specifically to check 17 them. But we monitor the reported pressures from them. 18 And we also do inspections.</p> <p>19 MR. JENSEN: But if you set it at 330 pounds, 20 for example, that is it. And if you see anything above 21 330, the operator would be expected to shut down.</p> <p>22 MR. HILL: Then they're out of compliance, and 23 they'd be subject to a Notice of Violation. And they'd 24 have to reduce the pressure.</p> <p>25 MR. SHEA: And is there a reason in the day and</p> <p style="text-align: right;">Page 171</p>	<p>1 you wouldn't mind.</p> <p>2 MR. SHEA: On the map, which was marked as 3 Exhibit 7, it shows the Harley Dome site. And then there 4 is what's labeled a "Bitter Creek anticline." And I want 5 to have Mr. Allin explain to the Board why that anticline 6 wouldn't be a fracture that could cause leakage or a 7 conduit.</p> <p>8 MR. ALLIN: And I guess in response, for one 9 thing, the figure Exhibit 7 is of such a large scale, it 10 doesn't really show, and the anticline isn't labeled on 11 it.</p> <p>12 In the Rebuttal Exhibit 2, though, there's 13 enough detail that shows those structures and the 14 structural contours related to them.</p> <p>15 MR. HAROUNY: Exhibits 9 shows them.</p> <p>16 MR. SHEA: Taking Exhibit 2, it goes right 17 through the drill site straight to the Colorado River.</p> <p>18 MR. ALLIN: Okay. So on 9, what we're looking 19 at is in order to characterize the structural 20 configuration of these formations, we have a contour 21 line's area of equal elevation on that formation. In 22 this case, the one nearest the injection zone is labeled 23 1500 meters, in this case. Basically, the actual 24 elevation of the top of the Wingate, of course, is around 25 3500 feet in elevation above sea level.</p> <p style="text-align: right;">Page 173</p>

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<p>1 But the way the contours wrap around and the way 2 the injectate will move from a well -- and it's always 3 kind of a radial thing, anyway, out through the 4 perforations and into a porous formation -- the water is 5 mainly going to travel normal to those contour lines. 6 And, of course, the nearest normal point to the contour 7 lines in the well is actually drawn as an access for the 8 Bryson Wash syncline. And that's going to be the locus 9 of where the fluid is going to flow. And it's going to 10 be at a glacially slow rate. 11 For instance, a calculation that's made just on 12 the volume, even a conservative one of the volume of 13 fluid that's in the porous base in the injection zone, 14 will be about 10 million barrels. And so injecting at 15 rates of a couple thousand barrels a day, it takes many 16 years to even expel the brine water that's near the 17 wellbore any great distance. 18 MR. SHEA: Let me just point to the -- on the 19 map it shows a line that has a small arrow at the top 20 that's near the word "Bitter." And if you follow that 21 line down, it says "Bitter Creek," and then it says 22 "Anticline." It crosses the intersect of 1500 feet. And 23 then if you go down to where it says "Nearest Outcrop, 24 5.8 miles," it says "1750." 25 My original question was: Why will that</p> <p style="text-align: right;">Page 174</p>	<p>1 conclusion on the questioning you have for Mr. Allin? 2 MR. SHEA: Yes. 3 CHAIRMAN JOHNSON: Yes. 4 MR. SHEA: There will be? 5 CHAIRMAN JOHNSON: That's all the questions you 6 have for Mr. Allin? 7 MR. SHEA: I do. 8 CHAIRMAN JOHNSON: Okay. Thank you. 9 Does the Board have questions for Mr. Allin? 10 Okay. 11 Ms. Lewis, do you have redirect for Mr. Allin? 12 MR. CLAWSON: No, I don't. 13 CHAIRMAN JOHNSON: Okay. Thank you, Mr. Allin. 14 Do you have any other witnesses, Mr. Clawson? 15 MR. SHEA: I do not. I'm finished. 16 CHAIRMAN JOHNSON: Okay. 17 Ms. Lewis. 18 MS. LEWIS: We don't have any more questions for 19 Mr. Allin. 20 CHAIRMAN JOHNSON: Do you have any witnesses? 21 MS. LEWIS: Yes. We have two witnesses today. 22 We have with us Christopher Kierst, environmental 23 specialist, and Brad Hill, the permit manager. 24 In the issue of brevity, our presentation is 25 going to be rather short.</p> <p style="text-align: right;">Page 176</p>
<p>1 anticline, as a fault, not be a place that the water 2 might migrate to? 3 MR. ALLIN: Mainly because it's a fold and not a 4 fault. 5 MR. SHEA: Okay. And the fold does not have the 6 means of having water migrate to it? 7 MR. ALLIN: It can migrate to it, through it, 8 but it has to be pumped there. You have to be able to 9 put enough head onto it to back it up 800 feet across all 10 those contour lines. And that's what's impossible to do. 11 With the pressure limit that's going to be granted for 12 this project, which will probably be -- whether it's 350, 13 360, 330, it doesn't matter. If that's the pressure 14 limit, then it's going to be impossible, even with the 15 lowest density water I can find, which is fresh with a 16 pressure gradient of .33 psi per foot. Adding another 17 350 pounds to it, I can't push any water up 800 feet. 18 It's just physically impossible. 19 MR. SHEA: All right. Thank you. 20 Can I take one minute to -- 21 CHAIRMAN JOHNSON: Go ahead. 22 MR. SHEA: All right. Do we have an opportunity 23 to summarize, or is that -- if I say we're concluded 24 now... 25 CHAIRMAN JOHNSON: I'm assuming that's only the</p> <p style="text-align: right;">Page 175</p>	<p>1 MR. GILL: Could you get really close to the 2 microphone or use your microphone? 3 CHAIRMAN JOHNSON: Combination of both of you. 4 Let's have them sworn, Ms. Lewis. 5 MS. LEWIS: Okay. Swear in our witnesses. 6 Could you please state your name. 7 CHAIRMAN JOHNSON: Mr. Kierst? Go ahead, 8 Michelle. 9 THE REPORTER: Will you raise your right hands, 10 please. 11 You do solemnly swear the testimony you are 12 about to give will be the truth, the whole truth, and 13 nothing but the truth so help you God? 14 (The witnesses answered in the affirmative.) 15 MS. LEWIS: Okay. First we'll have Mr. Kierst. 16 CHRISTOPHER KIERST, 17 having been first duly sworn, 18 was examined and testified as follows: 19 DIRECT EXAMINATION 20 BY MS. LEWIS: 21 MS. LEWIS: Mr. Kierst, would you please state 22 your name and position with the Division, as you did? 23 MR. KIERST: Christopher Kierst, Environmental 24 Scientist III with the Division of Oil, Gas and Mining. 25 MS. LEWIS: Could you briefly identify for the</p> <p style="text-align: right;">Page 177</p>

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<p>1 Board your professional credentials?</p> <p>2 MR. KIERST: I have a degree in geology from the</p> <p>3 University of Missouri, Columbia. And in addition, I've</p> <p>4 got experience in the energy industry overall since 1972,</p> <p>5 and -- primarily in oil and gas. And a little bit of</p> <p>6 uranium geology, five-year stint with the Tennessee</p> <p>7 Valley Authority.</p> <p>8 MS. LEWIS: How many years have you been with</p> <p>9 the Division?</p> <p>10 MR. KIERST: I've been with the Division for 21</p> <p>11 years.</p> <p>12 MS. LEWIS: And what are your professional</p> <p>13 responsibilities for the Division in general, and what</p> <p>14 specific to the Westwater Farms application?</p> <p>15 MR. KIERST: I've got sundry duties with the</p> <p>16 Division of Oil, Gas and Mining. But as regards this</p> <p>17 matter, I'm the primary Class II program permit agent for</p> <p>18 the Division.</p> <p>19 MS. LEWIS: And earlier we submitted two</p> <p>20 exhibits we'd like the Board to take notice of. The</p> <p>21 first is the Permit Statement of Basis, and the second is</p> <p>22 the UIC Injection Analysis Form.</p> <p>23 So Mr. Kierst, are you familiar with these two</p> <p>24 documents, and have you examined them?</p> <p>25 MR. KIERST: Yes, I'm familiar with them.</p> <p style="text-align: right;">Page 178</p>	<p>1 that I was aware of at the time that I prepared these</p> <p>2 documents. So as of that time, there were no issues.</p> <p>3 MS. LEWIS: In conclusion, what would be your</p> <p>4 recommendation for the Board regarding the Westwater</p> <p>5 Farms application?</p> <p>6 MR. KIERST: I don't see any reason why they</p> <p>7 should be denied a permit.</p> <p>8 MS. LEWIS: All right.</p> <p>9 CHAIRMAN JOHNSON: Ms. Lewis, just to establish,</p> <p>10 you were calling it, I guess, Division Exhibit 2?</p> <p>11 MS. LEWIS: Umm-hmm.</p> <p>12 CHAIRMAN JOHNSON: And that was the Injection</p> <p>13 Permit Analysis Form?</p> <p>14 MS. LEWIS: Yes.</p> <p>15 CHAIRMAN JOHNSON: And that's four pages. Is</p> <p>16 that correct?</p> <p>17 MS. LEWIS: It's one page. It's a checklist.</p> <p>18 And essentially what it does is it lists --</p> <p>19 CHAIRMAN JOHNSON: Oh, I have four copies of it.</p> <p>20 That's why they don't have any.</p> <p>21 MR. JENSEN: Then the rest of us will be with</p> <p>22 you.</p> <p>23 MS. LEWIS: It just essentially enumerates the</p> <p>24 requirements of 649-5-2.</p> <p>25 CHAIRMAN JOHNSON: Thank you.</p> <p style="text-align: right;">Page 180</p>
<p>1 MS. LEWIS: Could you please briefly describe</p> <p>2 for the Division the purpose of these documents?</p> <p>3 MR. KIERST: The permit analysis form, I guess</p> <p>4 that's Exhibit 2, is essentially an inventory of items</p> <p>5 that the Division requires an operator to submit to</p> <p>6 obtain a permit for a Class II injection well.</p> <p>7 MS. LEWIS: Okay. And under this document, has</p> <p>8 the applicant fully satisfied all the requirements of</p> <p>9 Rule 649-5-2?</p> <p>10 MR. KIERST: That's what we find at this time.</p> <p>11 MS. LEWIS: Would you also please explain for</p> <p>12 the Division Item No. 2.7 that is currently in red and</p> <p>13 the status of that?</p> <p>14 MR. KIERST: Yes. At the time this form was</p> <p>15 printed, we had not yet received the compatibility</p> <p>16 analysis. We have received that compatibility analysis</p> <p>17 from Stewart Environmental. And we received it on</p> <p>18 December the 6th.</p> <p>19 MS. LEWIS: Do you feel the compatibility</p> <p>20 analysis is satisfactory?</p> <p>21 MR. KIERST: Yes, it is.</p> <p>22 MS. LEWIS: Do you feel any concerns raised</p> <p>23 about the application haven't been sufficiently</p> <p>24 addressed?</p> <p>25 MR. KIERST: I don't feel there are any concerns</p> <p style="text-align: right;">Page 179</p>	<p>1 MS. LEWIS: Does the Board have any -- sorry.</p> <p>2 CHAIRMAN JOHNSON: Okay. And the Permit</p> <p>3 Statement of Basis, did you call that Division Exhibit 1?</p> <p>4 MS. LEWIS: Yes.</p> <p>5 CHAIRMAN JOHNSON: And is Mr. Hill going to</p> <p>6 testify to that?</p> <p>7 MS. LEWIS: Mr. Kierst, as well. They're kind</p> <p>8 of taken in tandem to support each other.</p> <p>9 CHAIRMAN JOHNSON: Okay. I'm sorry, go ahead,</p> <p>10 then.</p> <p>11 MS. LEWIS: Mr. Kierst, do you want to explain</p> <p>12 just kind of, maybe in a narrative nature, Exhibit 1</p> <p>13 versus the checklist?</p> <p>14 MR. KIERST: Yeah. The information in Exhibit 1</p> <p>15 basically is a digest and statement of what the operator</p> <p>16 has submitted to satisfy the requirements to get a</p> <p>17 permit. And so we put it in narrative form. And it's</p> <p>18 basically our statement to support our decision for</p> <p>19 issuing a permit.</p> <p>20 MS. LEWIS: Those are all my questions for</p> <p>21 Mr. Kierst.</p> <p>22 CHAIRMAN JOHNSON: Okay.</p> <p>23 CROSS-EXAMINATION</p> <p>24 BY MR. JENSEN:</p> <p>25 MR. JENSEN: So as I look at this, Mr. Kierst,</p> <p style="text-align: right;">Page 181</p>

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<p>1 on page 2 of the Division Exhibit 1, the injection 2 pressure is going to be 260 pounds at the surface? 3 MR. KIERST: That was requested on the UIC Form 4 1 Application. That is Item No. 2 on the Permit Analysis 5 Form, the Exhibit No. 2. 6 MR. JENSEN: So I'm just trying to understand. 7 So if the permit issues, their limit is 260 pounds at 8 surface? 9 MR. KIERST: We may modify that, I believe. 10 That's all they asked for. 11 CHAIRMAN JOHNSON: That's at the surface. 12 MR. JENSEN: Okay. I'm trying to understand if 13 this Board grants it, are we granting it at 260 pounds? 14 MR. KIERST: We could grant the 260. At this 15 time, we don't have a set figure, I guess, that would 16 necessarily reflect that. 17 MR. JENSEN: I think that we've heard that 18 400 pounds is -- 19 MR. CLAWSON: That's 260 psi at the surface. 20 MR. ALLIN: That was the pretesting. 21 MR. CLAWSON: Can you explain? 22 MR. ALLIN: Yes. I think where the confusion 23 is, is that the UIC permit form, which I filed, was filed 24 in 2009 and almost a year before the well was drilled, 25 the exploratory well, the HD-1. And so it's just</p> <p style="text-align: right;">Page 182</p>	<p>1 Mr. Clawson, any objections? 2 MR. CLAWSON: That's fine. 3 CHAIRMAN JOHNSON: Mr. Shea? 4 MR. SHEA: No objection. 5 CHAIRMAN JOHNSON: Does the Board have any? 6 Mr. Payne? 7 MR. PAYNE: I have a question to -- we can take 8 care of this, and then if I could ask my question. 9 CHAIRMAN JOHNSON: So Division Exhibits 1 and 2 10 are in. 11 Mr. Payne, what was your question? 12 MR. GILL: Just a clarification. What was that 13 last -- was it 360 or 350? 14 MR. KIERST: 360. 15 MR. PAYNE: 3-6-0. 16 CHAIRMAN JOHNSON: Go ahead. 17 CROSS-EXAMINATION 18 BY MR. PAYNE: 19 MR. PAYNE: Question, Mr. Kierst: We've heard 20 discussion about no receipt of frac water, fracking 21 water, or if there were, that it would need some 22 pretreatment. Is that something that's typically 23 regulated by the Division? Where would such an operating 24 restriction be placed -- or Mr. Hill, one of the two of 25 you?</p> <p style="text-align: right;">Page 184</p>
<p>1 something -- it's a number that's fill-in-the-blank 2 because the way to determine what the maximum allowable 3 injection pressure is going to be is once you establish a 4 frac rating. So you have to establish a frac rating. I 5 didn't have that data when I filled out the form and just 6 filled it in with 260. 7 MR. JENSEN: So the 260 is in the application, 8 which was filed at the beginning. Now you've drilled the 9 well. Now you've got your information. What's the 10 number? 11 MR. ALLIN: Well, the number will probably be 12 something more like 360. 13 MR. JENSEN: Okay. And what is -- I'm just 14 trying to get a handle on if we approve this, at what 15 level are we approving it? 16 MR. KIERST: Given what we normally do as far as 17 backing off the breakdown pressure, it would be probably 18 around 360. 19 MR. JENSEN: Okay. Thank you. 20 CHAIRMAN JOHNSON: Ms. Lewis, would you like to 21 enter Exhibits 1 and 2? 22 MS. LEWIS: Yes. I'd like to enter Exhibits 1 23 and 2. 24 CHAIRMAN JOHNSON: We'll call those Division 25 Exhibits 1 and 2.</p> <p style="text-align: right;">Page 183</p>	<p>1 MR. HILL: A Class II injection well is allowed 2 to take any type of fluids in that are RCRA exempt for 3 that Class II injection. And completion and stimulation 4 fluids do follow under what is typically allowed in Class 5 II wells. So we usually don't try and separate out 6 different types of fluids. We're specifically looking if 7 that RCRA exception applies. 8 MR. PAYNE: So the BLM concern about gas 9 generation and the proponent's offer of not accepting 10 those fluids, that's just an agreement, side agreement, 11 between them and BLM? The Division is not part of that? 12 MS. LEWIS: That's voluntary with them, that's 13 not a restriction generally placed on a Class II well by 14 the Division. 15 CHAIRMAN JOHNSON: Thank you. 16 Ms. Lewis, have you finished your examination of 17 Mr. Kierst? 18 MS. LEWIS: I just have a brief question for 19 Mr. Hill. 20 CHAIRMAN JOHNSON: Let's see if anyone else has 21 questions for Mr. Kierst, and then we'll move on. 22 MR. CLAWSON: No questions. 23 CHAIRMAN JOHNSON: Mr. Shea? 24 MR. SHEA: I have, and it's a follow-up on Mr. 25 Payne's question.</p> <p style="text-align: right;">Page 185</p>

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<p>1 CROSS-EXAMINATION</p> <p>2 BY MR. SHEA:</p> <p>3 MR. SHEA: It could be a condition to the</p> <p>4 granting of this application, could it not, that we</p> <p>5 accept or that we -- sorry. I always like to think of</p> <p>6 the royal "we."</p> <p>7 The Board could accept the offer by the</p> <p>8 proponent for the application, that they would accept no</p> <p>9 fracked water as a condition for the granting of the</p> <p>10 application.</p> <p>11 MR. JENSEN: Well, they've said they'll accept</p> <p>12 it. It's that they won't inject it.</p> <p>13 MR. SHEA: Inject it. Thank you. That's what I</p> <p>14 meant.</p> <p>15 MS. LEWIS: It seems that -- I mean, under the</p> <p>16 requirements, the Division is only required to -- Class</p> <p>17 II injection wells for those type of wells that frac</p> <p>18 water is exempt under RCRA, so they wouldn't need to have</p> <p>19 any kind of conditions on the permit. It seems it would</p> <p>20 be more an appropriate accommodation between the BLM and</p> <p>21 operator.</p> <p>22 MR. HAROUNY: I'm in full agreement of that.</p> <p>23 MR. JENSEN: That wasn't Mr. Shea's --</p> <p>24 Mr. Shea's question was: Would it be problematic if your</p> <p>25 permit contained that stipulation?</p> <p style="text-align: right;">Page 186</p>	<p>1 a question of whether you had the power to do that. And</p> <p>2 so far, I've heard what the practice is, but not whether</p> <p>3 you could put that as a condition.</p> <p>4 MR. HILL: That would also put the Division in</p> <p>5 having to monitor that for compliance. And we're a</p> <p>6 little uncomfortable arbitrarily picking and choosing</p> <p>7 between legal fluids and making them conditions of</p> <p>8 approval. It may be more of a legal question. I'm not</p> <p>9 sure whether the Board should or could do that. I can't</p> <p>10 answer that.</p> <p>11 MR. SHEA: I guess my only question is: If not</p> <p>12 the Board and the Division, then who would do it?</p> <p>13 CHAIRMAN JOHNSON: The rules, the way they're</p> <p>14 written, do not exclude frac fluids.</p> <p>15 MR. SHEA: I understand that.</p> <p>16 CHAIRMAN JOHNSON: I think that's --</p> <p>17 MR. SHEA: I'm asking the reverse of the</p> <p>18 question: Because they don't exclude it, does that mean</p> <p>19 you can't include it?</p> <p>20 MS. LEWIS: It's not really in the purview of</p> <p>21 what we're supposed to be doing.</p> <p>22 MR. SHEA: Why is it that administrative</p> <p>23 agencies can, without specific statutory or regulatory</p> <p>24 restrictions, say, "This is a condition by which we would</p> <p>25 exercise these activities"? And I'd point to</p> <p style="text-align: right;">Page 188</p>
<p>1 CHAIRMAN JOHNSON: Based upon the regulations,</p> <p>2 that's not a requirement that the Division would place on</p> <p>3 the permit. Is that correct?</p> <p>4 MS. LEWIS: Yeah.</p> <p>5 MR. JENSEN: That's correct.</p> <p>6 CHAIRMAN JOHNSON: So that will be up to the</p> <p>7 permittee if they wanted to place that restriction upon</p> <p>8 themselves.</p> <p>9 MR. PAYNE: The question was not whether they</p> <p>10 normally do, but could they. That's your question.</p> <p>11 MR. SHEA: That's correct.</p> <p>12 MR. PAYNE: Could the Division impose that</p> <p>13 condition, was the question.</p> <p>14 MR. SHEA: And if I could, just to suggest that</p> <p>15 when you are working on an MOU from the EPA to have the</p> <p>16 federal regulations handled by the Board, which I think</p> <p>17 is a good idea, then there is some latitude with what</p> <p>18 would be a sister agency; namely BLM, who is not present</p> <p>19 here today.</p> <p>20 MR. CLAWSON: I think that's a legal conclusion</p> <p>21 whether they could.</p> <p>22 MR. SHEA: Well, that's what I was asking.</p> <p>23 CHAIRMAN JOHNSON: Okay. So Mr. Shea, I'm</p> <p>24 taking that as another suggestion that you have for them.</p> <p>25 MR. SHEA: It wasn't a suggestion. It was just</p> <p style="text-align: right;">Page 187</p>	<p>1 R641-100-400, "Deviation From the Rules. When good cause</p> <p>2 appears, the Board may permit a deviation from these</p> <p>3 rules insofar as they may find the compliance therewith</p> <p>4 to be impractical, unnecessary, or in the furtherance of</p> <p>5 justice or the statutory purpose of the Board."</p> <p>6 CHAIRMAN JOHNSON: Mr. Shea, I'll take that as a</p> <p>7 suggestion that you have for the issuance of a permit.</p> <p>8 And the Board will take that into consideration. So</p> <p>9 let's move forward. I don't think the Board's prepared</p> <p>10 to give you an answer on that now.</p> <p>11 MR. SHEA: And I do greatly appreciate the</p> <p>12 Board's indulgences today. I do think at some point that</p> <p>13 question should be answered so the parties in the</p> <p>14 future -- in two weeks, you are going to be faced -- or</p> <p>15 in your January meeting, you're going to be faced with</p> <p>16 another injection well application approximately</p> <p>17 two miles away. So I think this is going to be a</p> <p>18 repeating kind of question. And the jurisdictional</p> <p>19 authority of the Board would benefit from being clarified</p> <p>20 on that. So I take it as a suggestion.</p> <p>21 CHAIRMAN JOHNSON: Okay. Thank you, Mr. Shea.</p> <p>22 MR. SHEA: Okay. Could I follow up, though?</p> <p>23 CHAIRMAN JOHNSON: Yes. You still have</p> <p>24 questions for Mr. Kierst?</p> <p>25 MR. SHEA: I do.</p> <p style="text-align: right;">Page 189</p>


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<p>1 CHAIRMAN JOHNSON: Go ahead.</p> <p>2 MR. SHEA: Are there other conditions,</p> <p>3 consistent with the regulations, that you think the Board</p> <p>4 should consider in light of the application?</p> <p>5 MR. KIERST: I don't think I see any of these</p> <p>6 coming up.</p> <p>7 MR. SHEA: Thank you.</p> <p>8 CHAIRMAN JOHNSON: Does the Board have any</p> <p>9 questions for Mr. Kierst?</p> <p>10 Do you have any redirect, Ms. Lewis?</p> <p>11 MS. LEWIS: No. I agree with the Board's</p> <p>12 comments.</p> <p>13 CHAIRMAN JOHNSON: Okay. Let's move on to</p> <p>14 Mr. Hill.</p> <p>15 BRAD HILL,</p> <p>16 having been first duly sworn,</p> <p>17 was examined and testified as follows:</p> <p>18 DIRECT EXAMINATION</p> <p>19 BY MS. LEWIS:</p> <p>20 MS. LEWIS: And we would just like to have</p> <p>21 Mr. Hill address paragraph C of Living River's motion</p> <p>22 they filed this morning regarding the amount of the bond,</p> <p>23 as well as the well plugging plan.</p> <p>24 MR. HILL: The bond that we have on this well as</p> <p>25 an injection well is the same plugging bond that we have</p> <p style="text-align: right;">Page 190</p>	<p>1 CROSS-EXAMINATION</p> <p>2 BY MR. SHEA:</p> <p>3 MR. SHEA: I've had some unfortunate experiences</p> <p>4 with bonds for BLM. The calculation, as laid out in the</p> <p>5 application, is based on dismantlement. Is that correct?</p> <p>6 MR. HILL: I could not hear you.</p> <p>7 MR. SHEA: I'm sorry. The calculation, as laid</p> <p>8 out in the application, is based on dismantling the</p> <p>9 facility and plugging it?</p> <p>10 MR. HILL: Our bond would be considering the</p> <p>11 plugging of the well only. On occasion, if there's money</p> <p>12 left over, we would also do other reclamation-type things</p> <p>13 with that bond. But generally, it is for plugging the</p> <p>14 well only.</p> <p>15 MR. SHEA: There's a term from World War II of</p> <p>16 "snafu." Are you familiar with that?</p> <p>17 MR. HILL: I am familiar with that.</p> <p>18 MR. SHEA: If a snafu was to occur at this site,</p> <p>19 there would be nothing beyond the \$15,000 to compensate</p> <p>20 the State or any party that was injured by that. Is that</p> <p>21 correct?</p> <p>22 MR. HILL: That's correct. When you say</p> <p>23 "injured by that," I'm not sure what you mean.</p> <p>24 MR. SHEA: Say that something happened with the</p> <p>25 pumping or a spillage and one or two of the trucks, you</p> <p style="text-align: right;">Page 192</p>
<p>1 on all of our oil and gas wells everywhere in the state</p> <p>2 based on -- by rule, R649-3-1 establishes a normal</p> <p>3 plugging bond for wells between 1000 feet and 3000 feet</p> <p>4 at \$15,000.</p> <p>5 As far as plugging plans go, this well is also</p> <p>6 under the same rules as any other oil and gas well for</p> <p>7 plugging procedures, which is under R649-3-24. And if</p> <p>8 this well -- the operator should walk away and we're</p> <p>9 stuck with plugging the well, we have that bond. The</p> <p>10 Division would plug the well.</p> <p>11 If the well were shut-in for an extended period,</p> <p>12 it would be under the shut-in and temporarily abandoned</p> <p>13 wells rules, which are R649-3-36, on top of the required</p> <p>14 five-year mechanical integrity testing under the</p> <p>15 underground injection permit.</p> <p>16 So this well couldn't just be left open for an</p> <p>17 extended period and not be plugged if the well was not</p> <p>18 injecting under a valid permit.</p> <p>19 MS. LEWIS: That's all my questions for</p> <p>20 Mr. Hill.</p> <p>21 CHAIRMAN JOHNSON: Mr. Clawson, do you have any</p> <p>22 questions?</p> <p>23 MR. CLAWSON: I have no questions.</p> <p>24 CHAIRMAN JOHNSON: Mr. Shea?</p> <p>25 MR. SHEA: I do.</p> <p style="text-align: right;">Page 191</p>	<p>1 know, dumped their load, and somehow somebody was down</p> <p>2 stream.</p> <p>3 MR. HILL: So we needed some site remediation,</p> <p>4 or something of that nature.</p> <p>5 MR. SHEA: Yes. Right.</p> <p>6 MR. HILL: Depending on the extent of</p> <p>7 remediation needed, it may not be enough to cover it. We</p> <p>8 do also have the orphan well program funds from which we</p> <p>9 can draw to make sure the environment is protected and</p> <p>10 pollution does not occur from any given well.</p> <p>11 MR. SHEA: But in terms of what this application</p> <p>12 is bringing to the Division, it's the \$15,000. And then</p> <p>13 there are other sources that could be used for</p> <p>14 remediation. Is that your testimony?</p> <p>15 MR. HILL: There is, depending on what needed</p> <p>16 remediating, yes.</p> <p>17 MR. SHEA: All right. Thank you.</p> <p>18 CHAIRMAN JOHNSON: Does the Board have questions</p> <p>19 for Mr. Hill? Okay.</p> <p>20 Ms. Lewis, do you have any redirect of Mr. Hill?</p> <p>21 MS. LEWIS: No.</p> <p>22 CHAIRMAN JOHNSON: Okay.</p> <p>23 MS. LEWIS: The Division has no more questions.</p> <p>24 CHAIRMAN JOHNSON: No more witnesses?</p> <p>25 MS. LEWIS: No more witnesses.</p> <p style="text-align: right;">Page 193</p>

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<p>1 CHAIRMAN JOHNSON: Okay. Thank you.</p> <p>2 Mr. Shea, do you have witnesses?</p> <p>3 MR. SHEA: We have no witnesses.</p> <p>4 If we had had time, we would have liked to have</p> <p>5 brought a hydrologist, but we did not. So we have no</p> <p>6 witnesses today.</p> <p>7 CHAIRMAN JOHNSON: So you have nothing else.</p> <p>8 I'm trying to think where we're at now.</p> <p>9 Mr. Clawson, I guess you can summarize.</p> <p>10 MR. CLAWSON: Thank you, Mr. Chairman. I'll</p> <p>11 keep this really short. This has been a long hearing.</p> <p>12 And I think the Board's, you know, very well versed in</p> <p>13 the issues involved.</p> <p>14 The proposed Harley Dome No. 1 injection well is</p> <p>15 a simple UIC application. It would have been</p> <p>16 administratively approved by the Division. The Board</p> <p>17 wouldn't have even known about it except that Living</p> <p>18 Rivers and others filed objections when the notice of the</p> <p>19 informal process was published in the paper. That meant</p> <p>20 that we needed to come before the Board. And that's why</p> <p>21 we really are here. I think it's been educational for</p> <p>22 the Board, and it's probably been of benefit in that</p> <p>23 regard.</p> <p>24 But I would say that Westwater Farms has met its</p> <p>25 evidentiary burden. It has satisfied the regulatory</p> <p style="text-align: right;">Page 194</p>	<p>1 some additional evidence, we could submit it to the</p> <p>2 staff. They could determine whether it should be passed</p> <p>3 on to the Board or not.</p> <p>4 CHAIRMAN JOHNSON: Mr. Shea, could you give us</p> <p>5 some kind of indication of what type of evidence you are</p> <p>6 working on?</p> <p>7 MR. SHEA: Two-fold. During the lunch break, I</p> <p>8 spoke with a geohydrologist at the University of Utah,</p> <p>9 who is a colleague. And he has worked on injection wells</p> <p>10 specifically and the filtration, as well as the chemical</p> <p>11 processing that Dr. Stewart talked about. I want to</p> <p>12 explore with him as to whether or not he considers it</p> <p>13 adequate.</p> <p>14 If we are not able to generate anything, we</p> <p>15 certainly wouldn't. But I would hate to find out</p> <p>16 something that I think would be pertinent for the Board's</p> <p>17 review, and then because it was decided on the same day</p> <p>18 it was heard, not have an opportunity to present it.</p> <p>19 I also want to examine, again, through a</p> <p>20 geologist, any fractures or fault lines that might</p> <p>21 differentiate this area. I certainly appreciate</p> <p>22 Mr. Allin's testimony, but I think a second look at</p> <p>23 things would be of benefit. So that's the first request.</p> <p>24 The second request would be to have monitoring</p> <p>25 wells to the southeast. And again, I understand the</p> <p style="text-align: right;">Page 196</p>
<p>1 criteria necessary for the Board approving the UIC</p> <p>2 permit.</p> <p>3 And we've addressed the respondent's concerns.</p> <p>4 We have sworn testimony by expert witnesses that this</p> <p>5 water will not flow uphill to the Colorado River. And we</p> <p>6 also have sworn testimony that gas will not be allowed to</p> <p>7 be generated in the formation that the water's being</p> <p>8 injected into; and so therefore, gas also will not</p> <p>9 migrate to the Colorado river.</p> <p>10 I would urge that the Board approve this</p> <p>11 application. And I thank you for your time.</p> <p>12 CHAIRMAN JOHNSON: Ms. Lewis.</p> <p>13 MS. LEWIS: We feel -- the Division feels that</p> <p>14 the applicant has fulfilled all the requirements of the</p> <p>15 rules. And they, under their expertise, recommend</p> <p>16 approving the well.</p> <p>17 CHAIRMAN JOHNSON: Thank you.</p> <p>18 Mr. Shea.</p> <p>19 MR. SHEA: First, I'd like to thank the Board</p> <p>20 for their time. I appreciate this has been made more</p> <p>21 complicated, if you will, by my presence. And I've</p> <p>22 certainly appreciated the courtesies by you and the staff</p> <p>23 and Mr. Clawson.</p> <p>24 I would renew my request that the record be kept</p> <p>25 open for two weeks so that if we are able to generate</p> <p style="text-align: right;">Page 195</p>	<p>1 Board's inclination to accept the geology as being</p> <p>2 completely moving water uphill, which I appreciate from</p> <p>3 physics is impossible if not difficult. So but I still</p> <p>4 would make that request, that they -- I do think the</p> <p>5 Board is setting a precedent that other people in the oil</p> <p>6 and gas business are going to -- and Dr. Stewart, I think</p> <p>7 has done a very wise business investment on getting this</p> <p>8 going. And there will be others that will follow. And</p> <p>9 we ought to, you know, as a community, be able to look at</p> <p>10 whether or not monitoring in real time is an important</p> <p>11 aspect that is now technologically feasible without a</p> <p>12 great deal of additional cost.</p> <p>13 CHAIRMAN JOHNSON: Thank you. I didn't mean to</p> <p>14 interrupt your summary. So please go ahead.</p> <p>15 MR. SHEA: No. Again, it's one of those things,</p> <p>16 where I think anybody who witnessed the BP spill</p> <p>17 appreciates how, as we get more technologically advanced,</p> <p>18 the snafus that we all recognize happen can have a much</p> <p>19 greater ramification that we can ever believe or</p> <p>20 appreciate. And we need to take some moments to pause.</p> <p>21 And I can appreciate from Dr. Stewart's</p> <p>22 perspective the idea that they've been at this for a</p> <p>23 year-and-a-half. But given the location and given what's</p> <p>24 being injected, there needs to be very clear deliberation</p> <p>25 on that. That's it.</p> <p style="text-align: right;">Page 197</p>

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<p>1 CHAIRMAN JOHNSON: Thank you, Mr. Shea. 2 Is there anyone else present who would like to 3 address the Board regarding this matter? Seeing no one. 4 MR. JENSEN: Given that they've got a hearing on 5 tonight, why don't we take ten minutes and then caucus 6 and see whether we're inclined to reach a decision or 7 take it under advisement. 8 CHAIRMAN JOHNSON: Okay. Let's take a 9 ten-minute break. 10 And Mr. Clawson, I believe you have the next 11 matter, also. 12 MR. CLAWSON: It should be very short. 13 CHAIRMAN JOHNSON: It's just a report. 14 MR. CLAWSON: But I have to tell you about 15 something, too. But it will be very short, about five, 16 ten minutes. 17 CHAIRMAN JOHNSON: Then we will be hearing the 18 Wolverine matter after that. So let's take a ten-minute 19 break. 20 (A break was taken from 4:24 p.m. to 4:35 p.m.) 21 CHAIRMAN JOHNSON: Let's go back on the record. 22 Regarding the Westwater Farms request, the Board 23 feels unanimously that the petitioner has met its 24 requirements for approval of the UIC well. The injection 25 pressure should be set at 360 psi, subject to monitoring.</p> <p style="text-align: right;">Page 198</p>	<p>1 The record is closed. 2 If you would like our decision on the Order 3 reconsidered, you'll have 20 days from the date it's 4 signed to have that reconsidered. 5 MR. SHEA: I understand. 6 CHAIRMAN JOHNSON: Thank you. 7 (The matter was concluded at 4:38 p.m.) 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25</p> <p style="text-align: right;">Page 200</p>
<p>1 And in accordance with Board rules, if any 2 parties would like the decision by the Board 3 reconsidered, they have 20 days in which to do so. 4 So Mr. Clawson, would you please prepare the 5 Order? 6 MR. CLAWSON: I'd be glad to, Mr. Chairman. 7 The rules provide that I should have the Order 8 prepared within five business days after this hearing. 9 And I think it's pretty obvious I've got kind of a lot to 10 do. So I'd appreciate if there would be a little bit 11 more time for that. 12 CHAIRMAN JOHNSON: Mr. Shea would probably be 13 agreeable to you taking 20 days. 14 MR. SHEA: I'd be happy with that. 15 MR. JOHNSON: The 20 days runs from the written, 16 signed Order. 17 CHAIRMAN JOHNSON: That's 20 days from the 18 signed Order, Mr. Shea. 19 MR. SHEA: Yes, I understand that. And if Mr. 20 Clawson would like my help, I'm more than happy to... 21 MR. CLAWSON: Sure. 22 CHAIRMAN JOHNSON: Thank you very much. 23 MR. SHEA: In that time period, is the 24 administrative record open? 25 CHAIRMAN JOHNSON: No. The record is closed.</p> <p style="text-align: right;">Page 199</p>	<p>1 CERTIFICATE 2 3 State of Utah) 4 ss. 5 County of Salt Lake) 6 I, Michelle Mallonee, a Registered 7 Professional Reporter and Notary Public in and for the 8 State of Utah, do hereby certify: 9 That the proceedings of said matter was 10 reported by me in stenotype and thereafter transcribed 11 into typewritten form; 12 That the same constitutes a true and correct 13 transcription of said proceedings so taken and 14 transcribed; 15 I further certify that I am not of kin or 16 otherwise associated with any of the parties of said 17 cause of action, and that I am not interested in the 18 event thereof. 19 20 21 22 23 24 25</p> <p style="text-align: center;"> Michelle Mallonee, RPR, CSR</p>

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